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Canadian manpower problems were researched by a group of economists at the University of Toronto in areas of interest to manpower planners and students of the labor market. The dissatisfaction of policy makers with the present operation of the labor market is discussed in three areas: (1) inadequate output due to alleged labor shortages, (2) mismatching of labor demand and labor supply, and (3) manpower implications of the trade-off, the dilemma between employment and inflation. An analysis of the current labor market is made with reference to the writings of the 19th century classical economists Adam Smith and J.S. Mill. Studies on technological progress and labor displacement, structural unemployment, the analysis of labor market information, and educational planning are included. The output of postsecondary educational institutions is evaluated relative to intellectual development, educational services provided, and market evaluation. (CH)

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THE CANADIAN LABOUR MARKET

Readings in Manpower Economics

Arthur Kruger
Noah M. Meltz
editors

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Readings in Manpower Economics

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edited by

A. M. KRUGER
N. M. MELTZ

CENTRE FOR INDUSTRIAL RELATIONS
UNIVERSITY OF TORONTO 1968

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THE CANADIAN LABOUR MARKET
Readings in Manpower Economics

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To Lorne Morgan
an inspiring teacher
and
to our wives
Betty and Rochelle

Foreword

John H. G. Crispo

In recent years governments in most Western countries have decided that an active manpower program designed to influence the deployment of labour is indispensable. Labour relations policies are no longer confined to dispute settlement techniques and other industrial relations matters, and economic policies are no longer confined to the implementation of Keynesian doctrines.

In Canada this shift in emphasis is reflected in the creation of the Department of Manpower and Immigration at the federal level and in the increasing interest in manpower policies shown by provincial education and labour departments. It is also evident in the variety of new programs for training, retraining and moving labour.

This is an area where the pressure for state action has forced the development of programs with little opportunity for careful reflection on the more fundamental considerations involved in such intervention in the labour market. The need for careful study is obvious in such a sensitive and crucial field of public policy. This is precisely the sort of assignment the Centre for Industrial Relations at the University of Toronto was designed to handle. Encouraged by the federal and Ontario governments, we proceeded to develop an appropriate research project.

In selecting the labour market as our focal point, our purpose was to develop a framework within which its operation could be examined more analytically than it had been previously. We chose to explore a few subjects in depth rather than attempt a comprehensive study that would require resources far in excess of those available to us. The extent of our research is defined in the editors' preface, which indicates the areas studied and ties together the contributions made by the various authors.

After the project was conceived, the Centre's major role was to find the financial resources to make it possible. We were extremely fortunate in securing aid at both the federal and the provincial levels of government. At the federal level, we received assistance from the Labour Department University Grants Committee, a committee which gives assistance to university based projects of this kind. Provincially we received support from both the Ontario Economic Council and the Ontario Department of Labour.

The main impetus for the project came from the editors of this volume, Professors A. M. Kruger and N. M. Meltz, who not only coordinated the entire undertaking but themselves wrote two of the studies that appear in it.

The other contributors to the volume are all professors in the Department of Political Economy at the University of Toronto.

Arrangements for the publication of the volume and the final editorial work required were undertaken by Christine Purden.

As director of the Centre, I would like to express my gratitude to all those who made this volume possible.

John H. G. Crispo
Director of the Centre for Industrial Relations
December 1967 *University of Toronto*

Preface

Arthur Kruger
Noah M. Meltz

This volume brings together the results of research conducted by a group of economists at the University of Toronto in areas of interest to those concerned with manpower problems. We have not attempted to present a comprehensive coverage of the field. Rather, our purpose is to provide the public with the insights which economics can offer on a limited range of topics related to manpower. We feel that the papers included in this book do discuss thoroughly a few of the key issues of importance to manpower planners and students of the labour market.

The first paper, by Arthur Kruger, examines the allocation of labour by market forces in two ways: first, from a theoretical point of view; and second, through a discussion of departures from what he terms the theoretical ideal. These departures or imperfections can arise from market power by labour and/or management and from other barriers to mobility, including government policies. In considering these market imperfections Professor Kruger looks at private and social costs of promoting mobility. He also discusses manpower policies in the light of economic theory. Here he deals with three areas where policy makers are dissatisfied with the present operation of the labour market:

(1) Inadequate output due to alleged labour shortages.
(2) Mismatching of labour demand and labour supply.
(3) Manpower implications of the trade-off, the dilemma between unemployment and inflation.

The final section of Professor Kruger's paper presents a lengthy but simplified discussion of the theory of the operation of the market for labour services. This section deals with the determinants of demand for and supply of labour along with the interaction of the two which simultaneously produces a structure of wage rates and employment. The last theoretical consideration is the interaction among various markets in the economy.

Professor Kruger concludes with a plea to policy makers to recognize that wages as well as employment are determined in the labour market. Thus complaints of labour shortages may reflect either a lag in granting the wage increases dictated by the market or a sluggish worker mobility. Similarly, when action is taken to channel the allocation of labour, it tends to induce changes in relative wage rates. This has further repercussions because labour markets are linked with one another and with other markets through the price system. Hence, manpower policies which affect the labour market will feed back to other sectors with varying degrees of strength.

Finally, Professor Kruger notes that costs and benefits of manpower programs have to be assessed in terms of the impact on both individuals and society. This often requires judgements which tend to be based on hunches rather than on the theoretical apparatus of economics.

Samuel Hollander's article presents the development of the ideas of nineteenth century economists on the operation of the labour market. This article logically follows Professor Kruger's paper, exploring in depth the evolution of economic thinking underlying the current tools of labour market analysis.

Professor Hollander begins with two general topics: the wage structure and the role of government in education; and the attitude of the classical (nineteenth century) economists to trade unions. He then goes into a detailed study of the views on the operation of the labour market. First, he examines the classical theories of labour supply and labour demand. Next he considers theories of wage determination, employment and unemployment.

This paper demonstrates that many of the issues currently under debate were also discussed by political economists a century and more ago. Adam Smith writing in 1776 condemned government aid to vocational training except when the economy was undergoing rapid changes in products and processes. The classics generally supported government intervention in elementary education which they felt would increase labour mobility. The early economists also recommended what we would today call guidance programs: "... a case was sometimes made for state support of an educational program which would encourage workers to avoid overcrowded occupations...." (p. 93).

Adam Smith "envisaged a mechanism which assured that earnings in different occupations would tend to keep in line, so that different monetary returns in long-run equilibrium merely reflected the varying degrees of attractiveness attached to each occupation" (p. 82). Under Smith's mechanism disagreeable jobs would be more highly paid than pleasant ones. J. S. Mill writing in the mid-nineteenth century disagreed with Smith's analysis, believing that Smith did not recognize the impediments to mobility, both financial and social. Moreover, Mill assumed that an excess supply of labour exists. Given these impediments and some excess supply of labour, Mill observed that the least agreeable occupations are paid the least.

Some classical economists believed that a union was incapable of raising the wage rate per man except under special circumstances, such as when the rate was initially below the competitive rate as a result of employer pressure. Mill felt that unions could raise real wages per man employed, but that they could not do so without generating unemployment. Mill adopted the argument that non-unionized labour would suffer a serious disadvantage.

Unionism was recognized as a factor contributing to labour immobility. Another factor was contemporary practices relating to apprenticeship which were condemned by Adam Smith.

In developing the theories of wages and employment, Professor Hollander notes the role ascribed to the service sector by the classical economists in absorbing excess labour. He also discusses the early application of the concept of bargaining to the labour market as separate from a determinant solution through the interaction of labour demand and supply.

The classical writers believed that unemployment could only be temporary on the assumption that a corrective device existed: downward flexibility of prices and money wages. Technological unemployment was ignored by Adam Smith because he felt that profitability for employers lay in the output-expansive effects of technological change rather than in the labour displacing effects.

Later writers felt that displaced labour would be reabsorbed by the economic system in the long run through an expanding national product.

Yehuda Kotowitz in his article takes up the question of the labour displacing effects of technical change. He uses a theoretical framework to examine the relationship between technical progress and unemployment, and then looks at the empirical evidence for the prewar and postwar periods in Canada.

Professor Kotowitz begins by describing the way in which the demand for labour is formed at different levels of technology. His discussion goes behind the labour demand schedule which Professor Kruger utilizes in his presentation. Changes in technology are shown to take many forms, such as invention of new products and improvements in the production process. The common characteristic of all technical progress is that it enables a firm to produce the same output with a smaller amount of each factor of production (labour, capital and resources) or more output with the same factors of production.

Technical progress (sometimes referred to as innovation) does not always affect the demand for factors of production in the same way. Professor Kotowitz develops a model in which there are only two factors of production: labour and capital. He shows that there are three possible effects of technical change on factor inputs: labour saving, capital saving and neutral. A labour saving innovation does not necessarily reduce the demand for labour in an industry, because higher output may increase demand for labour sufficiently to offset the substitution of capital for labour.

Empirical research by Professor Kotowitz shows that in Canada in the postwar period technical progress was labour saving. Since this was coupled with a sufficiently high rate of accumulation of capital as a result of a high level of aggregate demand, total employment increased and real wages rose.

In a concluding comment Professor Kotowitz points out that the impact of technical progress on employment (and unemployment) is quite different for the economy as a whole compared with the impact on firms or industries. Technological progress displaces individuals, but at the same time it makes possible continued simultaneous growth of employment and wages.

Concern with policy issues and differences in views among economists are not confined to the classical period of the nineteenth century. In his article John Winder reviews and appraises one of the most recent subjects of debate among economists: the question of whether the high levels of unemployment which existed between 1957 and 1963 were the result of deficient aggregate demand or of structural changes in the economy.

Professor Winder begins by asking what structural unemployment is and how it differs from other types of unemployment. He observes that unemployment can be classified on the basis of causes or cures, and that the so-called structural debate has centred on different recommendations for cures of relatively high unemployment. A related question has been raised in this debate. The existence of structural unemployment implies that the price mechanism for allocating labour has broken down and has to be supplemented by other (usually government) action.

The most interesting policy-oriented approach to the structural question has been developed by Richard Lipsey. In his formulation structural unemployment is defined in relation to policy makers' choice between price increases (inflation) and unemployment. The choice has acquired the technical term "trade-off". Originally A. W. Phillips discovered that there was an inverse relationship between the rate of increase in wages and the level of unemployment in the United Kingdom. It was subsequently found that a curve similar to this "Phillips curve" described the relationship between annual changes in the price level and the percentage of the labour force unemployed. The latter relationship was also inverse—that is, at high levels of unemployment there was little price increase, while at low levels of unemployment there was substantial inflation. This modified Phillips curve, or the trade-off curve, indicates that policy makers have to choose between so much inflation and so much unemployment, other things being constant. Hence the Keynesian prescription of solving unemployment by expanding expenditures (usually public expenditures) has to be considered in terms of the impact on prices. Lipsey's model measures structural unemployment as the amount of unemployment which can be reduced by shifting the trade-off curve as far as is desired, consistent with the costs and benefits associated with such movement. The primary means of shifting this curve is through selective labour market policies, the key to which is increased mobility. This increased mobility suggests that at each level of unemployment less inflation will now be encountered.

Sections 3, 4 and 5 of Professor Winder's paper are elaborations of the basic elements of Lipsey's concept, drawing from the writings of other authors. Winder comments that Canadian authorities have failed in some degree to understand the forces of inflation and the nature of the trade-off.

The results of empirical studies of structural employment and the related concept of the trade-off are presented in section 6 of Professor Winder's paper. Lipsey demonstrates that it is not possible to test the theories of the causes of unemployment by studying the characteristics of the unemployed. Dernberg and Strand have found evidence that changes in participation rate (that proportion of the population membership in the labour force) in response to different levels of unemployment may adversely affect the trade-off. In this section are included the results of several Canadian studies showing patterns generally similar to the results obtained for the United States. Professor Winder notes that few studies of structural unemployment have attempted to include cost-benefit analysis.

The final section of the article is devoted to policy conclusions. First, Professor Winder asserts that aggregate demand policies are the most important. However, he observes that Americans and Canadians have tended to lower their sights (that is, to accept higher rates of unemployment), while Europeans have aimed for reduced rates of unemployment. North American policy has put higher priority on balancing the budget, maintaining stable prices and so on.

In fighting the battle to reduce unemployment, aggregate demand policies and selective labour market policies belong together. The problem is how much should each do and what are the best forms. In assessing each, especially labour market policies such as retraining and geographic mobility, cost-benefit analysis has to be used. It has been suggested that, in addition to labour market policies, the trade-off dilemma can be reduced through a guidelines policy (that is, an incomes and prices policy). Professor Winder notes that the Economic Council of Canada feels Canada does not have a favourable environment for an incomes policy. In conclusion, he suggests that for a proper assessment of the amount of structural unemployment, much more research and analysis must be conducted on the trade-off between price increases and the level of unemployment.

A byproduct of the structural-demand aggregate debate has been an interest in manpower policies and in the operation of the labour market. The article by Noah Meltz examines both the information that is presently available on the labour market and the existing gaps in our knowledge. Professor Meltz begins by indicating the types of data that come under the heading of labour market information and the basis for classifying the various types of data. Following a list of various publications which include labour market statistics, he presents a resumé of the information each contains. Five monthly publications provide almost all of the primary statistics available in Canada. The following four are issued by the Dominion Bureau of Statistics: *The Labour Force*; *Employment and Average Weekly Wages and Salaries*; *Man-hours and Hourly Earnings*; *Federal Government Employment*. The Department of Labour's *Labour Gazette* also has some original data compiled by the Canada Manpower Service.

A separate section is devoted to a discussion of the analysis of the information which is regularly published, and the available data relating to manpower forecasting are examined. To complete the article Professor Meltz discusses present gaps in labour market information.

Professor Meltz concludes that an enormous number of detailed statistics are published each month but little description is given of the major developments and almost no analysis of the factors responsible for the changes. He also indicates that there is no methodical or ongoing attempt to pull together the various aspects of the labour market in terms of an examination of overall developments. Thus wage changes tend to be treated separately from employment changes, in spite of the generally accepted view that the interaction of wages and employment levels is critical. Although it is fraught with enormous difficulties, there are still some benefits to be gained from more research into manpower forecasting. Professor Meltz feels that the pay-off of this kind of exercise in terms of new knowledge of the operation of the labour market may be at least as great as the benefits to education and training authorities.

The last part of Professor Meltz's article is concerned with recommendations. He suggests that there is need for an annual assessment of developments in the labour market along the lines of the United States *Manpower Report of the President*. He also suggests a revision in the monthly reports of the Canada Department of Manpower and Immigration in order to draw on a broader base than simply their own operations. He proposes that, monthly or quarterly, developments in various labour markets be drawn together. Professor Meltz indicates that we need additional statistics on earnings and employment by occupation.

Information on the labour market has important implications for educational planning, as Ian Drummond discusses in his article. Professor Drummond begins by examining the connection between the educational system and labour markets. He claims that the educator cannot make plans without knowing about present and future market developments as reflected in the earnings of various occupations. By the same token the labour economist cannot understand what is happening in labour markets unless he knows what the educational system is doing. Today's labour market is largely a "human capital" market, as a result of the embodiment of education in persons. Schooling changes labour supply, but it also changes labour demand through the likes and dislikes which are acquired at school.

It is claimed by the Economic Council of Canada and others that education raises output. Professor Drummond suggests that education only increases potential and that actual output will not increase unless demand expands. Even though the average duration of formal education is lower in Canada, we still do not retain all the highly educated people we so expensively train. Will an education expansion simply increase emigration? Professor Drummond states that it remains to be shown just how the educational shortfall of Canadian managers *vis-à-vis* the United States has affected our managerial performance. However, we do know that education increases mobility and allows people to move into more productive occupations.

After briefly examining the changes which have taken place in the labour market, Professor Drummond turns to cost-benefit calculations which can be used in educational planning. He also includes some actual calculations for twenty occupations in Canada. Professor Drummond explains how benefits and costs can be calculated separately and then converted into a ratio. Benefits represent the discounted future pay-offs. The reason why future pay-offs are discounted is that, since one has to wait to get them, they are not now worth their eventual dollar amount. "For instance, if I buy a piece of land and keep it for five years, I shall expect to be able to sell it for at least the purchase price plus interest; otherwise, I shall have lost something by holding the land" (p. 255). An interest rate is used to represent sacrificed outlays. Professor Drummond adopts the difference between the income of schooled and the income of less schooled as the best available measure of economically relevant benefits. Other items which should be included but cannot be measured at present are external economic benefits, internal non-economic benefits and consumption benefits. These concepts are explained in the article. In another article in this volume, David Stager argues that one measure of educational output is intellectual development. Professor Drummond agrees, adding that this can mean an increase in problem-solving ability and adjustment of persons to a highly organized society of large units. However, the best measure of the benefits of education is still added income associated with more schooling.

Costs are easier to calculate than benefits. Professor Drummond suggests the inclusion of foregone income and foregone output (if the economy is at full employment) along with the direct costs of education: teachers' salaries, building costs, land cost, equipment and book costs, and so on.

Educational projects make sense if their social benefits exceed social costs—that is, if the cost-benefit ratio is greater than unity. Professor Drummond suggests two other tests that an educational project should pass: the rate of return should be as high as the rate of return on other investments; highest possible social benefit should be obtained per dollar outlay.

Professor Drummond has prepared empirical examples of the cost-benefit ratio for a range of occupations discounted at 5 and 10 per cent, including and excluding output foregone. He observes that there is no single rate of return on human capital. At 10 per cent discount most occupations yield a ratio in excess of unity. At 5 per cent all occupations, except males completing high school and nurses, produce a ratio exceeding unity.

He explains the low ratio for nurses on the grounds that society exploits them—in the sense of paying less than their services are worth to society. Most really high cost-benefit ratios are attached to guild-like professions which control their own entry and in part control the number of students—for example, lawyers, dentists and doctors.

Several conclusions are presented in Professor Drummond's article. The first is a warning to educational planners ". . . lest the economic analysis of education produce a perverted educational system" (p. 252). However, economic analysis is still needed and Professor Drummond proposes that cost-benefit analysis be used in conjunction with manpower forecasting. Since all investment is based on uncertain calculations about the future, the calculations can help us toward better choices. Professor Drummond also advises educational planners to consider relative earnings and impact on the distribution of income of alternative plans. Finally, he notes that in Ontario large sums are being invested in new post-secondary institutions, technical institutes and community colleges. Yet the public has not been told "whether the outlays are economically justified, in the sense that their social benefits will exceed their social costs" (p. 286).

In the final article, David Stager discusses conceptual difficulties in measuring the output of post-secondary educational institutions. He deals only with the instructional aspect, thereby excluding research output. There are three approaches to the measurement of educational output: intellectual development; educational services provided; and market valuation. Most educators feel that intellectual development is the principal instructional product of the school system. However, even with aptitude and achievement tests, there are still difficulties in measuring and comparing results. Curriculum hours are a measure of the education services produced, but they are likely to be less satisfactory as technology in education changes. Market valuations are represented by earnings differentials. Although Professor Stager indicates some of the limitations of this measure, in conclusion he points out that it is still the most suitable means of comparing the output of different types of institutions.

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1

Micro-economic Theory Labour Allocation and Manpower Policy*

Arthur Kruger

INTRODUCTION

A distinction may be drawn between employment policies designed to influence the overall levels of labour demand by means of monetary and fiscal measures, and manpower programs designed to alter the allocation of the labour force among occupations, industries and geographic regions, primarily by influencing the quantity and quality of labour supply in response to past, present or anticipated shifts in the composition of labour demand. These two subjects are closely interrelated: on the one hand, allocation questions are more readily resolved when overall unemployment is low; on the other hand, overall unemployment in turn is reduced when the market allocates labour efficiently. (Part of the unemployment results from "frictional" delays in the movement of workers from declining to expanding sectors or regions.) Nonetheless, considerable academic research as well as government practice tend to treat these as separate problems, particularly for purposes of policy formation. For example, in Canada at the national level the Department of Finance and the Bank of Canada function as agents of public policy influencing the levels of aggregate employment, output and price change, whereas the new Department of Manpower and Immigration (and perhaps to a lesser extent the Departments of Industry and Labour) is responsible for national manpower policy. In many provinces, the provincial departments of labour and education devote increasing attention to the manpower implications of their existing programs and to the formulation of new activities intended to influence labour allocation. Similar changes are taking place in the United States and in Europe.

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* I am indebted to Professors Crispo, Hollander and Meltz who made a number of very helpful suggestions which I have incorporated in this paper.

How can the tools of economics be employed to assist those formulating manpower and education programs? No economist claims for himself the right to decide what allocation of labour is "best". Few would argue that the marketplace as it now operates produces *the* perfect solution to some "ideal" pattern of manpower allocation. However, economists and policy makers seem to agree that if all markets were perfectly competitive,[1] there would be little need for conscious efforts to influence labour allocation since the market would achieve the "best" pattern without government intervention. If manpower policies rest on the politicians' argument that the labour market works "imperfectly", then the policy makers might profit from what light economics can throw upon the forces which actually influence wage and employment behaviour in a "perfectly competitive" market, on the sources of likely "imperfections" in the labour market, and on the manner in which manpower programs might influence the labour market and related markets. This paper will attempt to examine these problems through the use of simple economic models.

In our society we rely largely on market forces to determine what is produced, how goods and services are produced, how our basic factors of production (labour, land, capital and enterpreneurship) are allocated among industries and geographic regions, and how the output of commodities is distributed among households. While we continue to lean heavily on the price system to achieve these ends, there are numerous instances where public dissatisfaction with the operation of market forces has led to state intervention in the market to influence directly or indirectly the way in which crucial economic decisions are made. In particular, the recent interest in government manpower programs implies dissatisfaction with the way in which the free market allocates labour.

For a variety of reasons, policy makers may be dissatisfied with the market-determined allocation of labour and may therefore seek to formulate manpower programs to "correct" these imperfections. There appear to be several principal bases for current dissatisfaction with the operation of the labour market. One objection often raised is that public desires concerning the distribution of output among goods and services are frustrated by an inappropriate allocation of manpower. Consequently, it is said, our need for more and better education, health and other facilities are unattainable due to "shortages" of the required highly skilled personnel. These persistent shortages, attributed to defects of the market mechanism, require correction through state action. Such a conclusion was reached by the Royal Commission on Health Services. The Commission suggested that the state intervene to assure an increase in the supply of medical personnel.

A second objection to the operation of our labour market in practice is an alleged habitual mismatching of labour demand and supply among occupations, geographic regions and industries. The evidence cited for these so-called structural imbalances in the economy is the simultaneous presence of unfilled job vacancies and unemployment.[2] These critics of the market also point to the uneven incidence of unemployment among workers of differing age, sex, skill, industrial attachment, geographic residence, level of education and so on, as further signs of market imperfection. Indeed, concern with unemployment and the role of manpower policy as a device for reducing unemployment have been prime considerations in the formulation of these programs in recent years.[3]

Finally, some observers question whether the labour market, as it now operates, provides the sort of distribution of our human resources which will make the maximum contribution to the long-run rate of economic growth. Closely tied to this issue is the question of whether our educational system is geared appropriately to the labour market requirements of the future.[4]

The objective of this paper is to highlight the insights which economic analysis (specifically micro-economics) can provide, both on the sources of some of the deficiencies in the labour market and on the impact of some of the manpower programs which have been suggested as suitable for coping with the alleged market deficiencies. Our purpose is to explain in theoretical terms how the market mechanism operates to allocate labour among occupations, regions and industries at any given moment in time, and how it induces changes in manpower deployment over time. "Micro-economics" is the technical term used for this approach since we are dealing with events in selected markets in isolation from general economic conditions. "Macro-economics", which treats the total economy as a unit, will not be considered in this book. Readers interested in such broader questions as the determinants of the overall level of employment should refer to the papers by Professors Hollander and Winder in this volume or to one of the basic textbooks in economic theory. In this paper we will assume that the state employs the appropriate monetary and fiscal policies to keep overall unemployment down to some acceptable level, and that manpower policies are designed to supplement rather than displace these more general weapons against unemployment.

Readers with little formal training in economics might find it helpful to turn to the appendix at the end of this paper before reading the sections immediately below. (In the appendix the concepts of labour supply and demand are explained.) The first section below applies the apparatus developed in the appendix to show how wage rates and employment are determined in competitive markets. Next, attention is focused on those forces which tend to relate markets to one another. This is followed by a discussion of some of the more significant deviations from "perfectly competitive" conditions which are to be found in the labour market, including those created by existing public policy. We then consider social welfare as a justification for manpower programs. In the concluding portion, the various assumptions underlying manpower policies are examined in relation to the theoretical models which have been developed.

THE DETERMINATION OF WAGE RATES AND EMPLOYMENT

In the labour market, as in other markets, demand and supply interact to determine simultaneously the level of price (wage rate) and of quantity exchanged in the market (employment). In Figure 1-1 we have drawn the demand *DD* and supply *SS* schedules for commodity *X*, which could be any good or factor of production including some variety of labour.

The forces of the market will tend to establish a price of \$$OP_o$ per unit with the weekly amount exchanged in the market equal to OQ_o units. If the price were higher than OP_o per unit, for example \$$OP_1$ per unit, then the quantity supplied, OQ_b

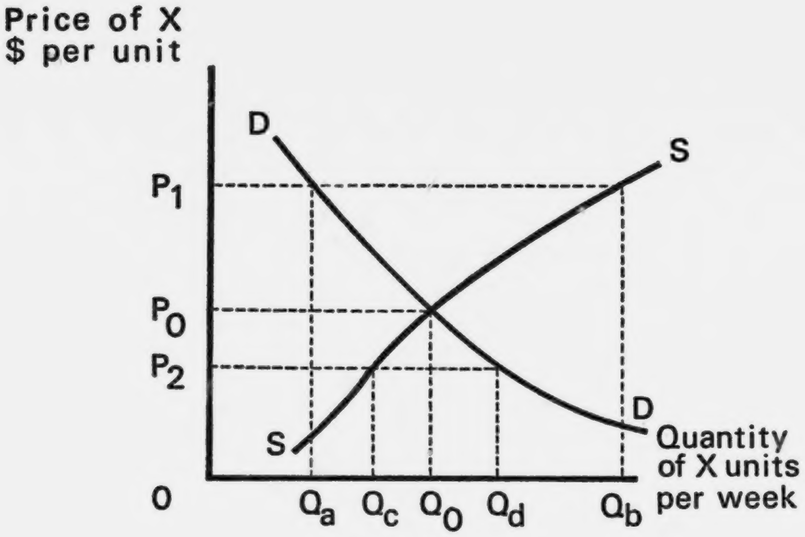

Figure 1-1

units per week, would exceed the quantity demanded, OQ_a units per week. The existence of Q_aQ_b unsold units each week would eventually force a price drop until the price fell to $\$OP_0$ per unit where the quantity supplied would just equal the quantity demanded and thus the market would be cleared. Similarly, a price below $\$OP_0$ per unit, say $\$OP_2$ per unit, would be unstable. Here the quantity demanded OQ_d units per week would exceed the weekly output of OQ_c units. The unsatisfied buyers would bid up the price until a price of $\$OP_0$ per unit was established and there was no further excess or unsatisfied demand.[5] In the next two sections of this paper, we will examine the impact on the market level of price and quantity exchanged as demand or supply respectively are changed. Since this study focuses on the labour market, we will give these variables their customary names of wage rates and employment. The analysis is equally applicable both to the study of the total labour market where the quantity units would have to be stated in terms of homogeneous "efficiency units"[6] in order to be meaningful, and to the market for a given type of labour homogeneous enough to apply a measure such as man-hours.

A Shift in Labour Demand

Figure 1-2 illustrates the impact of a shift in labour demand. The movement from D_0D_0 to D_1D_1 indicates a rise in labour demand, whereas a movement from D_0D_0 to D_2D_2 shows how a fall in labour demand will act on the level of wages and employment. Note how the wage rate and the employment level both move together in the same direction when labour demand changes (as long as the supply curve has normal shape and does not shift).

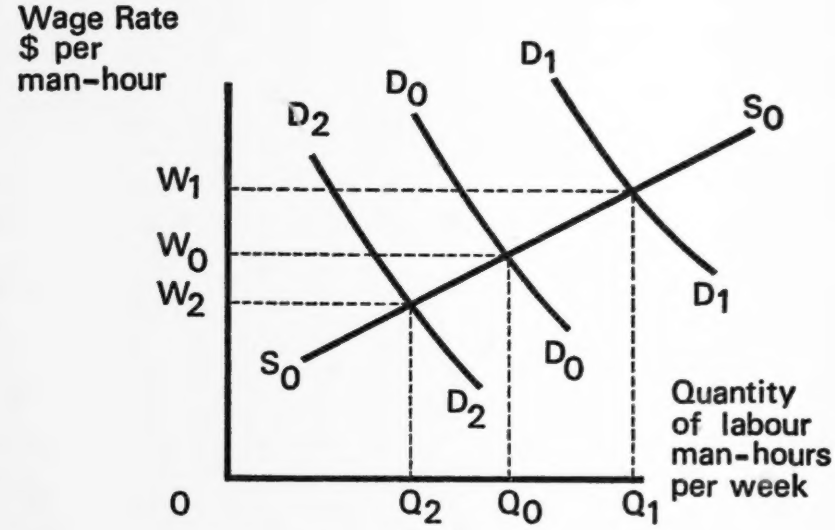

Figure 1-2

The reader will observe that the shape of the labour *supply* function will exert an important influence on the extent to which a given *demand* shift alters the wage rate and the level of employment. In Figure 1-3 we show a rise in labour demand from D_0D_0 to D_1D_1, but this time we have drawn several labour supply schedules with different shapes or "elasticities" all of which would have yielded the same equilibrium wage and employment initially (a wage rate of $\$OW_0$ with employment at OQ_0 man-hours per week) but result in different wage-employment changes after labour demand increase.[7] If we look at the supply schedule S_0S_0, then the impact of a rise in labour demand is as in Figure 1-2 with both wage rates and employment rising. However, if our supply curve were flat or "perfectly elastic" like S_1S_1, then a rise in labour demand would leave the wage rate unchanged but would raise employment to OQ_1, a larger change than was the case with supply schedule S_0S_0. If S_2S_2 were the relevant supply curve (that is, a vertical or perfectly inelastic supply), then the wage rate would rise much

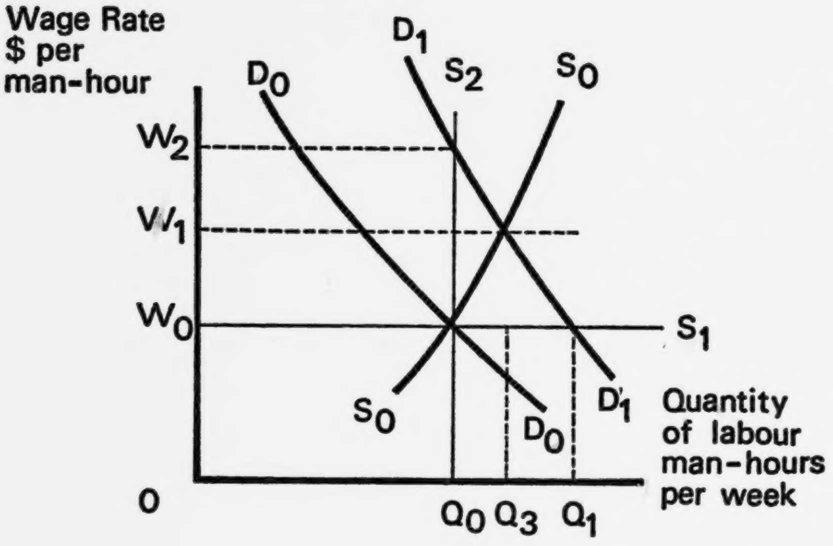

Figure 1-3

more (to OW_2) than in the other cases; but employment would not change at all. Thus the relative size of the wage and employment impacts of a given shift in labour demand would depend on the shape of the labour supply schedule. The more elastic the labour supply, the greater the employment effect and the less the wage impact of a given shift in labour demand. We noted earlier that the elasticity of supply for a given type of labour in turn depends on the willingness and ability of workers to move from other markets to this market or from here to other markets. This depends on the time period available for movement and on such factors as the non-wage preferences of the workers involved, the range of skills possessed by these and other workers, the extent to which this market is very similar to or different from other markets, and so on. In general the elasticity of labour supply (that is, the percentage change in quantity supplied for a given percentage change in wage rates) will be greater when the following conditions occur:

(1) The time period for adjustment is increased.

(2) Non-wage conditions of employment are not an important consideration to workers.

(3) Workers can adapt readily to many occupations.

(4) Jobs in this market are similar to those performed elsewhere.

Shifts in Labour Supply

In Figure 1-4, the impact of changes in the labour supply schedule are shown.

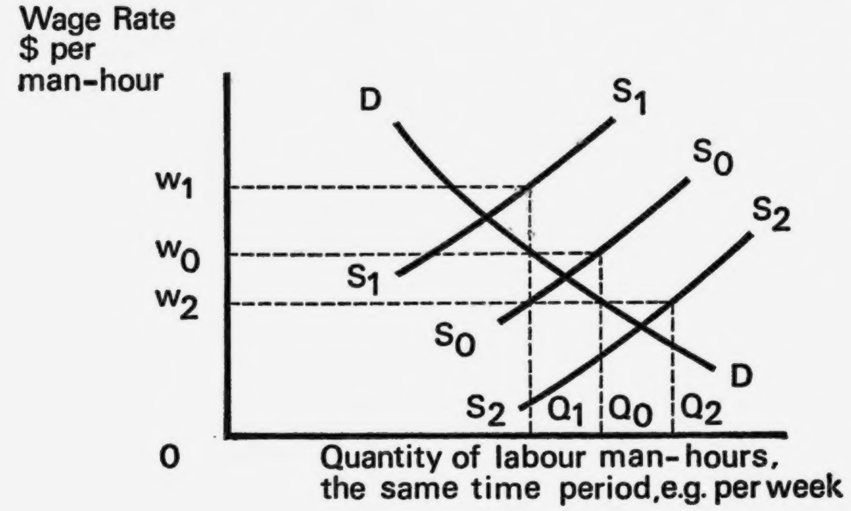

Figure 1-4

Here a fall in supply from S_0S_0 to S_1S_1 cuts employment but raises wage rates. A rise in supply (S_0S_0 to S_2S_2) lowers the wage rate but raises employment. The impact of a given supply shift on the wage rate and on employment depends on the shape of, or more properly the "elasticity" of, the labour demand schedule.

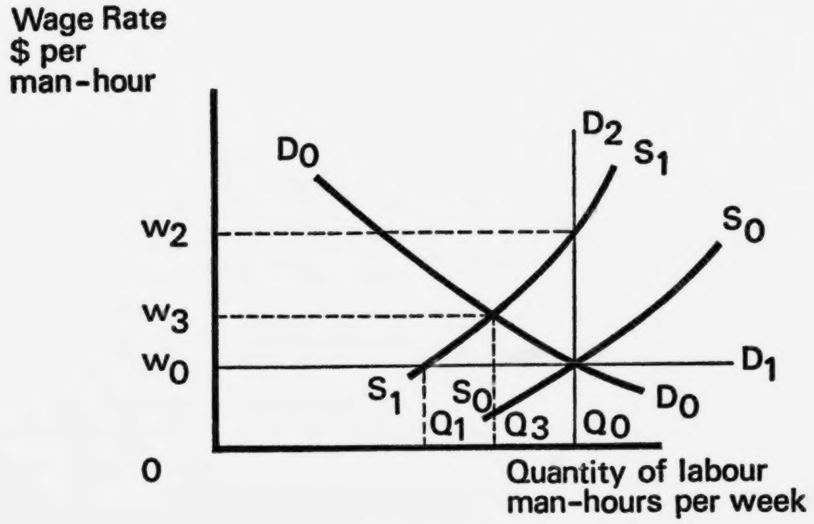

Figure 1-5

This is illustrated in Figure 1-5. If the demand schedule was horizontal or perfectly elastic (D_1D_1 in Figure 1-5), then the wage rate would remain constant and the level of employment would drop from OQ_0 to OQ_1, when supply fell from S_0S_0 to S_1S_1. If the demand schedule was vertical or perfectly inelastic (D_2D_2 in Figure 1-5), then employment would not change but the wage rate would rise from $\$OW_0$ to $\$OW_2$. In the intermediate case of a demand schedule like D_0D_0, the level of employment would fall to OQ_2 (by less than was the case with D_1D_1) and the wage rate would rise to OW_2 (by less than it would if D_2D_2 were the relevant demand schedule). Thus for a given shift in labour supply, the more elastic the relevant labour demand schedule, the more employment would change (in the same direction as the shift in labour supply) and the less wage rates would move (in a direction opposite to the supply and employment shifts).

The elasticity of labour demand depends on a number of factors. The longer the time period under consideration, or the more the elasticity of product market demand or the greater the range of choice among production techniques, or the greater the elasticity of supply of other factors, then the greater the elasticity of demand for this kind of labour.[8]

THE INTERACTION AMONG MARKETS[9]

At the outset, it was indicated that the prime interest of this paper was in the factors influencing the distribution of manpower among jobs, rather than in the determinants of the aggregate number of jobs or workers. Let us now use the tools we have developed to see how changes in manpower deployment occur.

We know that the demand for a given type of labour will change in response to one or more of the following situations:

(1) Changes in the level of demand for products made with this kind of labour. This in turn reflects changes in the tastes or incomes of the buyers of the product, or in the prices of related products (substitutes or complements), or in the size of the relevant market.

(2) Technological change which may alter the desired ratios of factor inputs.

(3) Shifts in the prices of related factors used in pro-

duction including other kinds of labour—that is, those factors which are used along with this kind of labour in production (complementary factors), or those factors which can be substituted for this kind of labour in production.

Thus the demand for a given type of labour is responsive to changes in product markets and to changes in other factor markets as well as to changes in technology. Since it is common for a given type of labour to be used along with other kinds of labour or to be substituted for other types of labour, there is often a strong interrelationship between the demand for a given kind of labour and wage rates elsewhere.

The supply of a given type of labour will change in response to one or more of the following:

(1) Changes in wage rates in other occupations or regions or industries. An increase in wage rates elsewhere will diminish the supply of a given type of labour provided workers are able and willing to change employment. Conversely, a decrease in wages elsewhere raises the supply of a given type of labour.
(2) Changes in non-wage aspects of employment.
(3) Changes in worker assessment of alternative occupations.
(4) Changes in the costs of acquiring this kind of skill or related skills.

Thus the interrelationship among labour markets which are obvious in discussing the demand for a given type of labour is present on the supply side of the market as well. As long as many workers are reasonably mobile and responsive to improved income possibilities, then the supply of any given type of labour will shift with changes in relative wage rates caused by movements in labour demand.

Supply and demand shifts are often interrelated, with changes on one side of the market operating through the wage structure to induce changes on the other side of the market.

In general, such shifts in labour demand and/or supply are accompanied (not necessarily instantaneously) by changes in product prices, in the mix of product output, and in relative wages rates as well as in manpower deployment by occupation, industry and region. Thus, for example, if people decide to acquire more education, this will tend to lower the size of the wage-differentials for educated workers over the less educated and induce shifts in methods of production toward techniques employing better educated personnel, thereby altering relative demands for these kinds of workers in favour of the more highly skilled workers. What begins as a movement *along* a demand curve caused by a shift in supply can eventually produce a shift of the demand schedule resulting from changed factor proportions as a consequence of relative wage rate changes. Similarly, demand changes can influence supply. Thus a rise in the demand for professors will raise their incomes. Students may then decide to acquire Ph.D.'s rather than law degrees, thereby raising the supply of professors but lowering that of lawyers from what it otherwise would be.[10] This in turn will alter the relative wage rates and factor prices for these other workers and factors. Such changes will induce further factor substitution, again altering relative factor prices (including relative wage rates) and so on.

Such a change will not only alter the deployment and relative remuneration of factors (including various kinds of labour), but it will also influence the composition of *product* output. Different industries employ varying factor mixes. Furthermore, the elasticities of demand vary greatly among products. Thus, where the relative wage for type *A* workers falls, the relative prices of goods made with *A* will fall, and sales will rise in these sectors particularly in industries where these workers constitute a major input or where product demand is highly elastic. Expansion in output here is at the expense of output in sectors using factors whose relative prices rise as a result of the fall in relative wage rates for *A*,[11] or in sectors utilizing little *A* but making commodities which are substitutes for the goods made by type *A* workers. These shifts in product output in turn feed back in labour and other factor markets altering relative factor prices. This then sets off a new round of change and so on. Eventually all markets may settle down to a new equilibrium, but the distribution of output, relative product prices, the deployment of factors and relative factor prices will differ from the initial situation.

Summary

This treatment is by no means as rigorous as it might be, but it should serve to indicate the complex interaction of changes among markets with a change in one market affecting numerous product and factor markets. This is a fact we have noted earlier in discussing both labour supply and labour demand, but it is most evident here when the interaction of supply and demand and the determination of wage rates and employment are examined. If the reader is left with the impression that what has been said is that any market change feeds back on other markets, then he has absorbed only a part of the message of this section. While we emphasize the extensive links among markets which are particularly strong for labour, a factor utilized in the production of every commodity, we have also suggested that the interaction is stronger among some markets than it is among others. Thus we may conclude that a given labour market has stronger links with products utilizing this kind of labour extensively than it does with other product markets. Similarly, factors (including other kinds of labour) which are used as complements or substitutes also have strong market links to one another. Finally, occupations that require similar training and skills tend to be closely related. In assessing the impact of a shift in demand or supply in one market it is often important to consider the impact such a change has in related markets. Manpower programs are designed to alter the supplies of some types of labour, but in the process they will influence events in a number of other markets as well.

SOME POSSIBLE MARKET IMPERFECTIONS[12]

There are important kinds of imperfection in the labour market which require some discussion because of their possible critical impact on the mechanism described heretofore (and in the appendix). These will be treated briefly under the headings, market power and barriers to mobility.

Market Power

The first issue concerns the matter of market power of buyers or sellers of labour (acting as individuals or collusively) as reflected in their ability to influence wage rates. Of immediate concern to us are the influences that such market power may exert on the wage structure, thereby possibly inhibiting its usefulness as a labour allocation mechanism. Collective bargaining or unilateral action by a major employer of a given type of labour may produce a set of wage differentials other than those which would prevail under conditions of perfect competition. Indeed, there is every reason to believe that unions and employers are not engaged in a game of total self-delusion in the course of collective bargaining, and that the wage structure as it exists in all likelihood contains numerous deviations from the competitive norm.

Let us suppose that we begin with a wage structure that is in a competitive equilibrium (in all markets the wage rates have reached stable equilibria as shown by the level \$$OP_0$ in Figure 1-1), and then introduce collective bargaining as a "distorting" force. If in one sector a union manages to push the wage rate above what has prevailed and would prevail in a competitive market, or if in another sector a union prevents a wage rate from falling when competitive forces might indicate that a fall in wage rates should occur, then we will have cases of wage "distortion". What will happen to manpower allocation in such cases?

Figures 1-6 and 1-7 illustrate these two cases. In Figure 1-6, we assume that the competitive equilibrium would yield a wage rate of \$$OP_a$ with employment at OQ_a workers per week in this market (occupation, industry or region): If a union entered to force the wage rate up to \$$OP_u$ per hour, what would happen?[13] At the new higher wage rate, firms would cut employment to OQ_u workers per week. However, the workers heretofore employed in this market would have an even stronger incentive to

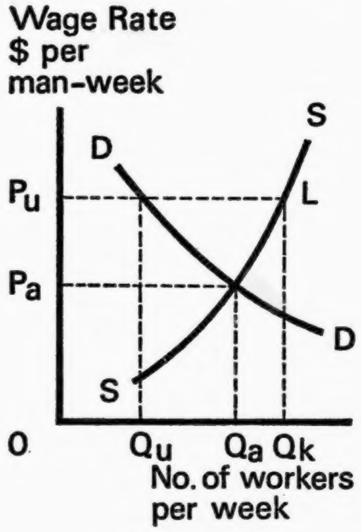

Figure 1-6

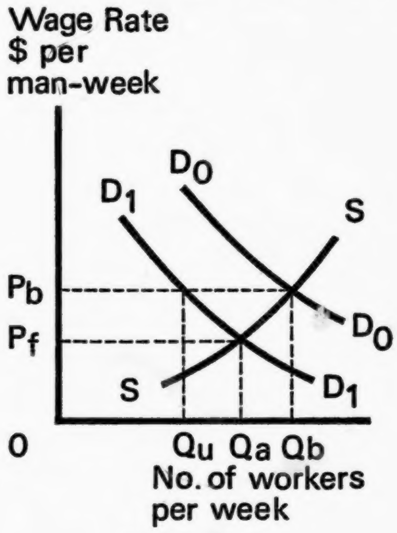

Figure 1-7

remain here, and indeed Q_aQ_k *new* workers would be attracted by the higher wage rate. The fact that employment was limited to OQ_u workers would eventually persuade Q_uQ_a workers to seek employment elsewhere and deter Q_aQ_k potential entrants from entering this market.[14]

In Figure 1-7 we assume a union enters a market and manages to prevent a wage cut from $\$OP_b$ to $\$OP_f$ which would occur as a result of declining demand from D_0D_0 to D_1D_1 in a competitive market. Here again, the success in keeping the wage rate above the competitive level results in a drop in employment to OQ_t which is below the new competitive employment level OQ_c. The displaced workers want to stay on here, but lack of job opportunities will force them to seek work elsewhere depressing wage rates in other labour markets.

It should be clear that where *employers* enjoy market power through collusion, or other means, and push wages down below the competitive level, workers will be induced to leave and seek jobs elsewhere, although such movement may take considerable time. Only in the unlikely cases of perfectly inelastic (vertical) labour demand or supply schedules would such distortions fail to alter manpower distribution. However, in such cases, changes in wage rates resulting from competitive market forces also leave manpower allocation unchanged.

In the extreme case where the wage structure or parts of it become completely frozen, changes in wage differentials could not occur to serve as the motive for the movement of labour in response to changes in relative demand. However, differential job opportunities would still reallocate labour in the desired directions. Thus in areas of declining labour demand, although wage rates would not fall, workers would be pushed out by lack of employment opportunities. They presumably would move to markets where expanding labour demand opened up new job opportunities even if wage rates were held rigid here by institutional forces. In brief, along with the push and pull of wage differentials, we also must recognize the complementary role played by differential job opportunities in allocating labour in markets where the wage structure has some built-in rigidities. Both sets of differentials tend to work together in the same direction to assist in allocating and reallocating workers in response to consumer demand, technological change and so on. While the direction in which labour is moved in such imperfect markets tends to be similar to that which occurs in a competitive market, the magnitude of labour shifts will differ in the two cases.

In other cases employers may exercise monopsony power prior to union organization. Indeed, it is generally believed that many non-unionized firms do have considerable discretion in fixing wage rates and employment. In such instances we could prove that a union might succeed in raising both wage rates and employment simultaneously and in bringing the market closer to the competitive solution through the exercise of such "countervailing power". One of the arguments often made in defence of public support for labour organization is that it serves to offset employer market power and that it may bring the labour market closer to the competitive position than it might otherwise be. However, there is no assurance that a union will not be strong enough to push wage rates above the competitive level and possibly reduce employment below the level that would prevail either in the competitive market or even in the situation where there was unchecked monopsony power.

In markets where employers or unions possess considerable power, employment is likely to be lower than under conditions of perfect competition. Wage rates may be lower or higher than the competitive rates, depending on whether it is the employer or the union that exercises the predominant market influence. The degree to which these forces move manpower allocation away from the competitive "ideal" will depend on how general such market power is, as well as on the strength of monopoly power in given markets. Many economists attack such market power on grounds of inefficiency in resource allocation and thus of retarded social well-being which it creates. However, anti-combines and labour relations legislation rather than manpower policy appear to be the accepted routes to correction. We will not treat this subject here. It should be noted, however, that if "efficient" allocation of labour is a manpower goal, then some attention might be given to our public policy in the areas of combines and labour legislation when manpower programs and policies are being considered.

Barriers to Labour Mobility

The perfectly competitive model is a simplification useful for analysis rather than a description of reality in *any* market. In the labour market in particular, reality deviates in numerous significant ways from the textbook picture of competition. Some of these deviations have been considered earlier. Now we will give our attention to such matters as imperfect knowledge, job equity and limited licensing or training arrangements.

A key factor in mobility in any market is extensive knowledge of alternative opportunities. In the labour market, knowledge is particularly imperfect. The wide geographic dispersion of jobs and workers, and the vast number and variety of buyers and sellers inhibit and distort the flow of information. Unless workers know where employment opportunities are and what are the monetary and non-monetary features of different jobs, changes in the structure of wages and employment opportunities will not necessarily lead to the manpower shifts we expect.

This is *not* to imply that for the necessary mobility, *all* workers must know about *all* available jobs or that *all* employers must know about *all* available workers. Indeed, perfect knowledge with instant mobility in response to demand shifts would be chaotic. Rather, what is required is "mobility at the margin". That is, when demand changes so that, for example, 1,000 more men are required in one area (industry, or occupation) or 800 less in another area (industry, or occupation), then some workers move into the expanding markets and others leave the declining sectors. The movement does *not* have to be a direct shift of the 800 displaced into the new openings. Indeed, such a nice, quick move would be most unlikely except in the rare case where the displaced workers and the new jobs were in the same community and were matched as to skills and perhaps industry. What is necessary is that *some* workers respond to the new job opportunities and presumably higher relative wage rates. Other workers in turn will move into the jobs vacated by the first movement. There may be many or few such waves of mobility until the 800 displaced workers finally are placed in jobs.[15]

Such movement in waves in fact describes the sort of mobility that occurs. For example, expanded job opportunities in British Columbia may be filled by workers from Alberta whose jobs in turn are filled by farmers leaving Saskatchewan where labour demand may be declining. Or a growing demand for engineers may be met by upgrading technicians, whose jobs in turn are taken by retrained and promoted skilled workers; and their jobs in turn go to the semi-skilled and so on.

The fact is that in many cases, market knowledge is inadequate for the required mobility to occur, even allowing for what may be considered a reasonable time lag. Thus, for example, many parts of the Maritime provinces have been plagued by chronic long-term unemployment even in periods of prolonged buoyant labour demand in central Canada.[16] Within a given geographic labour market, there are often inexplicable wage differentials which persist over prolonged periods without inducing the expected mobility.[17] In some cases union or government control over entry into certain jobs (to be described shortly) may explain these phenomena. In other instances, the explanation may lie in surprisingly strong worker locational, industrial or occupational preferences based on non-wage factors. However, there is little doubt that where wide differentials in wage rates or employment opportunities persist and are not readily explicable on other grounds, there is likely to be imperfect knowledge of market conditions.[18]

In discussing imperfections in knowledge, we have already suggested that institutional forces may inhibit mobility. There are certain non-wage characteristics of jobs which are established by management fiat or through collective bargaining. These can and do influence labour mobility. Thus, for example, where workers acquire "equity" in a job through seniority rules which provide job security or fringe benefits contingent on remaining with the current employer, workers with considerable seniority will be reluctant to change employment even though there are wage differential and other inducements to do so. Similarly, seniority rules governing promotion tend to segment the labour market, channelling occupational mobility in narrowly defined paths. While collective bargaining tends to extend such practices and make them more rigid, seniority rules are also observed under non-union conditions.[19]

State policies designed to ensure plentiful job opportunities could reduce the fear of job loss and thus lessen the importance to workers of seniority as a form of job insurance. Increased public welfare programs may well diminish the emphasis on seniority-based fringe benefits. Legislation designed to make such benefits portable from job to job would also diminish the impact of these programs on mobility.

Another barrier to mobility arises from government or union direct controls over entry. In many instances this is achieved by establishing educational or training requirements for certain jobs in excess of what employers would demand if free to hire as they wished. In some cases this is justified by the necessity to ensure public safety, but often the requirements are designed to limit entry into these jobs in order to improve the relative earnings of workers in them. The most obvious examples of the latter purpose is found where the requirements are set for new entrants well above those prevailing among existing practitioners who are permitted to continue practising without acquiring the additional training.[20]

Another method of inhibiting mobility is the use of some form of limited "licensing". In some cases a government permit is required in order to enter a certain type of work, and only a limited number of permits are issued or high fees are set for new entrants. In other cases, membership in a union or professional association is required as a precondition for employment. The union (or association) may set a limit on membership or impose a prohibitive fee on applicants for membership. Finally, where formal education is required for admission to a trade, a limitation may be imposed on the capacity of the training facilities, keeping it below the level at which all qualified candidates who desire entry could be accommodated.

In all such cases of barriers to mobility, the structure of wages and employment opportunities may shift drastically without resulting in the expected changes in manpower allocation. The labour supply function to these trades will be vertical (perfectly inelastic) over a wide range of possible wage rates. Manpower policies can and do address themselves to the matter of inadequate market knowledge. However, other rigidities—as we have noted—are often the outgrowth of government licensing and educational policies; or they arise from union and professional association practices condoned, if not in fact buttressed, by the state. In such cases, if manpower allocation is to be made more responsive to market forces, what is required is a re-examination of these other areas of public policy before embarking on manpower programs.

PRIVATE AND SOCIAL COST OF MOBILITY

Usually costs are attached to mobility which may inhibit movement in response to wage and employment opportunity differentials. The subject of job equity discussed above involved the inhibiting alternative costs of seniority-tied job security and fringe benefits. In treating the competitive market in Appendix A, such matters as non-wage preferences in location and industry, moving expenses, and education and training expenses are recognized as influences on manpower allocation. It is assumed that workers seek to maximize their well-being[21] and in so doing weigh expected benefits of changing their occupations or locale against expected costs (monetary and non-monetary). In a free society, there can be little objection to this kind of decision-making process. There are, however, several matters of public concern involved here. First of all, a rational decision implies knowledge of alternatives. We have already dealt with the imperfect state of knowledge in this market, particularly worker knowledge of the benefits of moving to alternative employment. Even on the cost side, workers may not have realistic information on the education and training facilities (and the costs of using these facilities) available to them and their children. State policies designed to disseminate further information on these subjects should improve worker decisions and contribute positively to labour market operation.[22]

Numerous government policies operate directly or indirectly to influence significantly the relative costs and benefits of alternative employments. This matter deserves greater attention than has been given to it thus far or than we can devote to it here. A few examples will suffice to indicate the sorts of alterations in costs and benefits arising from state policies. Government decisions on the nature and distribution of public education outlays tend to alter relative training costs and thereby influence the relative numbers acquiring various skills. This also changes relative labour supplies and thereby the structure of wages (benefits) in the future. The level and coverage of unemployment insurance, relief and other social welfare schemes alter the distribution of benefits associated with alternative jobs.[23] Laws governing school leaving age, maximum working hours, overtime wage premiums and so on also alter worker costs and benefits. Above, we have considered the matter of state licensing which affects relative wage rates as well as employment opportunities. Then of course, the new manpower and other programs to subsidize geographic movement and industrial relocation, to induce employers to hire older workers and so on are deliberately designed to alter relative employment opportunities and costs, and so to influence the magnitude and direction of mobility. The reader surely can think of numerous further examples of such changes in private cost-benefit calculations resulting from government policies.

The fact that governments are involved in such a wide variety of welfare and other programs raises the possibility of conflicts between maximization of individual well-being in deciding on employment and maximization of *social* returns over costs. For example, an unemployed worker may feel that the difference between what he could earn if he moved to where jobs are available and what he gets in unemployment insurance or relief benefits without movement is less than the "cost" of movement, and so he remains where he is. From society's point of view, it may be preferable to subsidize his retraining or relocation, thus lowering the cost of movement, until he is induced to move and no longer draw on public support. Such public programs may more than pay for themselves in saving on unemployment insurance and other benefits. Furthermore, if society feels that the output of, say, an unemployed Maritimer moved to a job in Sudbury, Ontario is preferable to the man's output of leisure activities and household chores if left without remunerative employment in the Maritimes, then there is a further benefit of subsidizing his movement.[24] If the state decides that more teachers are required because it is socially good to have a higher standard of education, then the government may intervene to raise the remuneration of teachers or to offer special grants to those training to be teachers, thereby inducing more to enter the teaching profession than would enter if market forces remained unchecked.

The controversial Freedman Report[25] on the subject of a company's rights and obligations in decisions on relocating facilities provides a good illustration of a clash of private employer interests and social well-being. Management of a corporation may decide that moving its facilities from point *A* to point *B* could result in a saving of $\$k$ per annum over a period of, say, twenty years. This move could mean that community *A* dependent on this employer is abandoned and decays, while in community *B* new schools, sewers, roads and so on must be constructed by the state so as to accommodate the moving workers. Furthermore, some workers who are unwilling or unable to move may become public charges. The workers involved may suffer severe capital losses on their homes in community *A*. Finally, those who move must bear monetary and non-monetary costs of movement. What if all of these costs, not considered in management's calculations, add up to more than $*k* per annum over the next twenty years? Should the firm be permitted to move? Should the firm shoulder some or all of these costs arising as a result of its decision to move? Should the state have the right to dictate the nature, pace and conditions of changes which corporations desire to make in cases where significant costs to the state and/or individuals result from corporate decisions? This is the theme of the Freedman Report and a matter which requires more attention than it has so far received.

Again, many more examples could be cited, but all of them point in the same direction. Once governments intervene on a large scale in the marketplace (that is, when collective consumption and income transfer programs become very important), then private maximization decisions may conflict with public maximization. The state now has an incentive to intervene either directly, by prohibiting what individuals may wish to do, or indirectly, by altering the costs or benefits entering into worker choices. It is on this basis that many of the new manpower programs can be and are justified.

One must be aware of some key factors involved in tying extensive state intervention in manpower, education and industrial location to this criterion of a disparity between social and private well-being. First, neither sort of well-being lends itself to the ready measurement required for such a comparison. Yet comparisons must be made and are being made on the basis of scant information, usually under severe political pressure emerging in crisis situations (like the railway dispute which led to the Freedman Report). Then, data alone cannot resolve this problem. There are no "objective" answers here. Value judgements must be brought to bear. *Any* action (including inaction) involves such judgements so that we are constantly faced with this problem in formulating public policy. One feels that only too often the value judgements behind policy decisions are not explicitly formulated even in the minds of the policy makers. Finally, unless the new programs are only *ad hoc* in nature or succeed in reducing the range of state involvement, one must be prepared to accept a self-generating expansion in the role of government in the market place. Most new measures enacted to protect social as against private well-being widen the possible area of future public-private conflicts and may create the necessity for further state intervention in the future.

MICRO-ECONOMICS AND MANPOWER POLICIES

At the outset we stated that manpower programs were addressed to the correction of what policy makers felt were defects in the way in which the market now operates to allocate manpower. The sources of dissatisfaction appear to be based on the following considerations:

(1) The growth of such sectors as health care and education which would be in the public interest is frustrated by the lack of necessary trained personnel. Manpower programs, therefore, are required if we are to get as much of these commodities as we should have.

(2) The market operates only imperfectly and unduly slowly to move labour from industries and areas of declining demand to the sectors and regions where demand has expanded. Thus we find persistent labour surpluses in some areas (for example, the Maritimes) while employers complain of labour shortages elsewhere (such as in northern Ontario copper mines or in the southern Ontario clothing industry). Manpower policies may serve to correct these current imbalances.

(3) If we continue to rely solely on monetary and fiscal policy to cope with unemployment, then we will experience excessive inflation and even labour shortages long before we wipe out the pockets of unemployment. Manpower programs, therefore, can assist in reducing unemployment while suppressing inflationary pressures.

(4) The sluggish way in which the market operates to reallocate labour in response to shifting demand (discussed above) also retards the rate of economic growth. Consideration of economic growth lies outside the scope of this paper. However, some reservations concerning market forecasting (which are stated below in reference to inflation) also apply to the use of manpower programs based on such forecasts as a stimulus to economic growth.

We have considered on page 20 a matter which has not been discussed very often by the politicians: social cost savings in various welfare programs which might be affected by manpower policies. Little more will be said on this subject here. However, we now will turn to an examination of the three other sources of discontent listed above and to some of the policies thus far applied or suggested as devices for correcting these alleged market deficiences.

Inadequate Output of Desired Commodities

Much has been said about the desirability of increasing the quantities of such services as health care and education available to the public. It is frequently asserted that nothing can be done until the bottlenecks caused by shortages of key trained personnel have been eliminated, and that to achieve this considerable sums of money must be spent to increase the supply of the necessary professional staff available to these industries. The Royal Commission on Health Services, for example, has stressed this point. The growing expenditures on post-secondary school education also have been justified in part on these grounds.

In some of these cases, the problem may be rooted in state-supported institutional barriers to entry, such as the limitation of training facilities so that qualified applicants are rejected; or in employer collusion to hold down salary levels; or in unduly restrictive qualifications for practising the profession. To the extent that these are responsible for inhibiting the operation of the market, what is required is alteration of existing legislation and policy rather than new manpower programs. Some changes of this sort have already been implemented.

However, there have been indications in recent years that manpower programs specifically designed to induce entry are considered necessary. Such programs operate through devices which either enhance knowledge or lower the cost of mobility. It is generally conceded that knowledge of earnings, working conditions and so on is relatively good in most of these professions and little effort, therefore, has been expended in this direction.

More has been done to reduce training costs through such programs as fellowships to graduate students intending to enter teaching, subsidized accommodation for nurses and doctors in residence, and so on. Students comparing relative costs and returns in various alternative professions will find these subsidized occupations more attractive now than previously. Considerable effort has also been devoted to inducing skilled immigrants to settle in Canada, thus raising supply as desired.

Our examination of micro-economics on pages 12-18 (and in the appendix) also suggests that other consequences will flow from such policies. First, the additional personnel attracted to these professions may be drawn away from the potential entrants to other occupations such as law, engineering and so on. This will tend to raise relative earnings in these other areas above what they otherwise would have been and to reduce the output of goods and services produced by such personnel. All of this is consistent with the stated goal of diverting resources to medicine and teaching.

The policies will also have the effect of keeping the incomes of doctors, nurses, teachers and so on below what they would be in the absence of such programs. With salaries lower than they otherwise might be, there will be less inducement to substitute equipment and lesser trained technicians for the professional personnel than would be the case if the supplies were not increased via such subsidies and if salaries were permitted to rise. What is desired is more output of medical and health services (or education). What is achieved is not only more of these services but their production via one sort of factor mix rather than another. Only if one assumes that the current factor proportions are fixed and immutable can one so readily translate the desire for more of these products into the necessity for proportionate increases in these inputs. *Once we allow for the possibility of factor substitution either now or in the future, then we must be concerned with the impact of these manpower policies on the introduction of new technology, and on the relative incomes of the various suppliers of factors to these industries as well as on the allocation of labour and the composition of our national product.*

Market Imbalances

The next and perhaps most frequently stated basis for manpower programs is the mismatching of demand and supply as evidenced by the simultaneous existence of labour surpluses (unemployment) and labour shortages (unfilled jobs). This argument is buttressed by the fact that many pockets of unemployment and unfilled vacancies have coexisted for prolonged periods. Finally, there is the assertion that unless deliberate action is taken, such imbalances will continue and perhaps even increase in the future.

Let us consider these arguments based on current, past and future imbalances. Nothing in economic theory suggests that at any moment in time all markets will be in equilibrium. Demand and supply schedules are constantly shifting for the reasons explained in the appendix. It takes time for prices to change and for factors to be reallocated in response to these price changes. Thus the coexistence of surpluses and shortages in various markets (including the labour market) at any given moment of time is not inconsistent with the predictions of the competitive model. Indeed, we should be quite surprised if such imbalances were not present at all times in a dynamic economy subject to persistent changes.

However, if unemployment or shortages become chronic in certain areas, we are entitled to question the effectiveness of market operation. In Canada, the chronic unemployment in the Maritime provinces is often cited as evidence of imperfect market operation. It should be noted that available evidence indicates that there has been considerable movement of population out of this area of low wages and scarce jobs to Ontario and the United States where job opportunities are more plentiful. However, the policy maker may feel that this movement has been too slow and that it requires action to speed the adjustment.

To the extent that action is taken to improve knowledge among these unemployed of job opportunities elsewhere, the operation of the market will be improved. Similarly, informing employers concerning the locational advantages of such depressed areas to induce them to locate or relocate in these areas may also contribute positively to the operation of the market. One may question such public expenditures on the basis of cost-benefit comparisons. However, the relatively low cost of programs designed to disseminate knowledge of current market conditions is likely to be justified by such a comparison. Indeed, these public programs are widely accepted as desirable and worth their cost.

The government may also intervene to induce industry to move to the unemployed or to subsidize outmigration of population from these areas. These programs are more controversial. Our earlier analysis leads to the question of why such inducements are necessary or why the movement does not occur spontaneously. In the case of industrial location, the answer usually is that the depressed areas offer no cost advantages and indeed are likely to be areas where the costs of production are higher than elsewhere. Subsidies for industrial location are therefore often subsidies to inefficiency, and in many cases government assistance must continue indefinitely if the firms involved are to survive in these areas. While this may be justified in some cases as preferable to payment of welfare benefits, it hardly commends itself as a satisfactory long-term solution.

Manpower policy has not relied very heavily on influencing the composition of labour demand in this way. The reluctance is based both on the inefficiency already noted and on the preference for letting consumer tastes and efficiency considerations dictate the composition of labour demand with manpower policies acting to facilitate the adjustment of labour supply to these demand changes. Thus we have witnessed the growth of programs such as adult retraining, grants for worker relocation and expanded vocational training facilities for youth, all designed to assist workers to move into areas and occupations where labour shortages are said to exist. Similarly our immigration policies are supposed to adapt both the number and composition of immigrants to our domestic labour market requirements.

These programs may operate to assist the unemployed in finding work. They also relieve employers in the "labour shortage" industries and regions of the costs of training and of raising wage rates to attract workers. In this sense, they are subsidies to the companies receiving those trained at public expense. Thus, when workers are trained for the clothing industry in Toronto by the Ontario government, this tends to hold down wage rates in the industry, to retard the introduction of labour substitutes in the production process and to hold down domestic clothing prices, thereby inducing more resources into this sector and out of other sectors than would otherwise be the case. We are in effect saying not only that we want more workers employed, but also that we prefer more Ontario-made clothing to more Canadian-made other goods and perhaps to more clothing from Quebec, Manitoba or foreign countries. Or when workers from the Maritimes are given subsidies to move to jobs in Ontario copper mines, we are not acting to provide them merely with employment but rather with employment in a specific industry. These workers are not handed the mobility grant and told that they can use it freely to go to any part of Canada and to any industry they wish. Some might choose to go to Ontario copper mines if given free choice, but others might prefer to work in Hamilton steel mills or elsewhere. This kind of manpower program then implies that more copper is preferable to more steel and also that it is desirable to encourage more rapid mechanization in the steel industry than in the copper industry.[26]

Numerous other examples could be cited. The point is that these programs are influencing more than the level and distribution of employment. They are also altering relative factor prices, influencing technology, changing relative product prices and influencing the composition of our national product. *We may or may not be satisfied with the way in which these manpower programs affect these other areas, but no full assessment of manpower policy is possible unless these other market effects are studied and assessed along with the impact on the workers immediately affected.*

Our discussion on pages 4-9 suggests some factors which influence the success of manpower programs in altering labour allocation. The effectiveness of public action on either the demand or supply side of a given segment of the labour market depends not only on what it takes to shift the desired (demand or supply) schedule but also on the elasticity on the *other* side of the market. Thus, for example, a given increase in the demand for a certain type of labour *ceteris paribus* will tend to raise both wage rates and employment. The more elastic the supply of labour, the more the impact will be on employment and the less the rise in wage rates. Conversely, a given rise in the supply of a certain kind of labour will result in a rise in employment and a fall in relative wage rates. The greater the elasticity of demand for this sort of labour, the larger is the employment impact and the smaller the wage reduction resulting from the supply change. The reader should bear in mind the great difficulty in estimating the shapes of the relevant demand and supply schedules. This problem cannot be discussed here, but it raises further doubts concerning our ability to predict the impact of any given manpower program.

Finally, we might note that the fact of market interaction (discussed on pages 9-12) raises serious doubts concerning the assumption that manipulation of labour supply is preferable to altering labour demand, because the former leaves consumer sovereignty intact as the controlling force over the distribution of market output. When relative labour supplies are altered, so are the relative costs of production of items made with labour. Given the critical role of labour in many sectors of the economy, *any manpower program worthy of our concern is bound to exert a considerable impact on relative product prices via the change in costs, and therefore change the distribution of product output from what it would be if consumer sovereignty prevailed.* The fact that the alteration in the composition of product output is less obvious when state policies operate through labour supply than when action is directed to the composition of labour demand does not make the changes in the composition of national output less real or less important.[27]

Unemployment and Inflation

Much has been written concerning the public policy dilemma in choosing the appropriate combination of unemployment and price level increase. It appears that both full employment and stable prices are impossible in a free market economy such as ours and that policy makers must accept larger rates of unemployment if the rate of inflation is to be checked; and conversely, they must tolerate heightened inflation as the price of lowering unemployment rates.[28]

Proponents of an active manpower program have argued that this is a way of lowering the inflationary impact of a cut in unemployment (or lowering the unemployment rate required to sustain a given degree of price stability).[29] When product and labour demand rise, unless supply is either perfectly elastic or also rises rather quickly, wage rates will rise.[30] This in turn will tend to raise costs, lower product supply and raise product prices. Anything which raises the elasticity of labour supply schedules or induces (or accelerates) such compensating supply shifts will help hold down price increases, particularly where the added labour is drawn from the unemployed or from increments to the labour force rather than from alternative employment.

There are some unanswered questions here. First, for such programs to be effective, one must be able to anticipate areas where labour growth (and decline) is likely to be greatest in the future so that the training, relocation and other mobility programs will move labour quickly as demand shifts occur, thereby repressing to some extent upward pressures on costs and prices. This involves market forecasting. The papers by Professors Drummond and Meltz in this volume treat the problem of forecasting at some length.[31] It is sufficient to point out here that the extensive market interaction which we have already discussed—combined with the numerous judgements concerning such matters as likely changes in public tastes, changes in the level and nature of technology changes, changes in world prices, the nature of supply and demand schedules in various markets, and so on which must be made in forecasting the composition of labour demand—have raised considerable skepticism of the ability of economists to provide guidance for such manpower and education programs. The expected nature of such changes involves judgements which often have little basis beyond personal opinions buttressed by recent or historical experience. There is no "scientific" way of predicting the values to be attached to these critical factors. Nor can actual results provide a solid criterion for assessing a given technique of manpower projection. First of all, the forecast period for many of these policies is quite long and so results are not known for a considerable period. Then, even if a forecaster has predicted with near perfect accuracy for a given time period, we have no assurance that his methods of establishing estimates will be equally valid in the following period. Finally, to the extent that policy is based on a forecast (which was initially designed to show what policy was necessary and therefore what would happen if no policy changes were made), the forecast itself will have altered the situation so as to make an assessment of the forecast very difficult. Policy, after all, will be designed to correct the very imbalances which have been predicted. The risk of dysfunctional "side effects", described above in regard to the correction of past and current market imbalances, is magnified when manpower programs are addressed to future market changes where so much sheer guesswork must be employed in formulating policy.

Finally, such programs are not costless and are worth carrying on only if the benefits outweigh (or at least equal) the costs. It is not apparent how one can state precisely the social costs of a given degree of inflation or a given level of unemployment, even if it were possible to forecast the direct and indirect costs and other benefits of a given manpower program.

CONCLUSIONS

Micro-economic analysis emphasizes the following factors which those concerned with manpower policy too often appear to ignore:

(1) In each market there are two dimensions: price and quantity exchanged. Thus each labour market has a wage as well as an employment dimension.

Market changes usually alter both dimensions. The direction of the changes expected in both dimensions as a result of a market change can be predicted with a high degree of accuracy. For example, a rise in demand usually will raise both price and quantity exchanged. Furthermore, changes in price and output can in turn be used to diagnose the nature of market changes. Thus, if both price and quantity exchanged rise, then we know that a rise in demand almost certainly has occurred. However, the problem of measuring the shapes of the relevant demand and supply schedules makes it hazardous to predict the *magnitude* of change.

In diagnosing labour market changes, both the wage and employment dimensions and changes therein must be considered. Thus a complaint of labour shortage may be a symptom of sluggish worker mobility. It may, however, also reflect a lag in granting the wage increases dictated by the market. In evaluating the expected direct impact of a given policy on a given market, changes in both of these dimensions must be considered. When action is taken to channel the allocation of labour, it tends to induce changes in relative wage rates and this has further repercussions.

(2) Markets are interdependent. Indeed, we depend on

this interdependence to achieve the mobility of resources and the alterations in product output which changes in public taste or technology dictate should occur. The price system provides the principal link among markets by inducing the desired quantity shifts in response to alterations in relative prices. Manpower programs usually imply that the price system has deficiencies and needs to be supplemented. In this country few would suggest that the price system be scrapped or even that it should not continue as the prime device for dictating resource allocation and the composition of national ouput. But if we feel that the system is deficient, then the nature of the deficiencies must be specified precisely. Policy must be addressed to proven areas of market inadequacy.

The impact of manpower programs on related labour markets, other factor markets and product markets must be assessed as well as their impact on the markets to which they are addressed.

(3) The costs as well as the benefits of these programs must be considered (with suitable discounting for benefits and costs that occur in the future).

In assessing costs and benefits, the impact on the workers and employers immediately involved and on society must be considered. Some of the costs and benefits cannot readily be reduced to quantitative terms. Nor is it likely that any given policy will be optimal simultaneously for employers, workers and society.

(4) Many manpower programs require judgements (or forecasts based on judgements) of future events for which neither economists nor other experts are equipped by their professional training *per se*. Such judgements often have to be made, but they are based on the hunches of the particular economist rather than on the theoretical apparatus of economics.

Appendix Labour Demand and Labour Supply

A. THE DEMAND FOR LABOUR

The price and quantity of labour services are determined by the interaction of the demand for and the supply of labour in the market. Throughout this section, unless otherwise indicated, we will assume that there is "perfect competition" in the market. This means that we are dealing with a market with a homogeneous product that is sold by numerous sellers and purchased by numerous buyers acting independently. No single person is able to exert a noticeable impact on the price of this commodity. There are no legal or institutional barriers preventing anyone from entering or leaving the market. All actual or potential participants have full knowledge of all relevant conditions in this market and in other markets. All participants in the various markets seek to maximize their well-being, which is assumed to vary directly with the level of income and the availability of leisure time.

The Concept of Demand

In deciding how much of a given commodity to buy or sell, one significant variable is the market price of the item in question. Thus the decisions on the quantity demanded and the quantity supplied of good *X* or factor *X* may be stated in terms of the varying amounts which will be bought or sold at various possible prices of *X*. In Figure 1A-1, the curve *DD* depicts the demand schedule for commodity *X* (which could be either a final good or a factor of production). It shows how the purchases of *X* would vary over some relevant period of time (such as a week) with the price of *X*, *ceteris paribus* (that is, with other factors assumed unchanged). In general we observe that the demand schedule has the negative slope (that is, it tends downward and to the right) indicated by *DD*, which implies that purchases of *X* tend to vary inversely with the price of *X* (that is, purchases increase when the price decreases and vice versa).

A demand schedule such as *DD* can be used to depict the quantity of a good *X* which a household will purchase at various possible prices of *X*. It also can serve to illustrate how *all* the households collectively will respond to price changes in this market. In the latter case, the curve is called the market demand curve and is derived by summing the demand schedules of the households. The demand schedule of a firm or a collection of firms in a given regional market for a factor of production, such as labour, will also have a negative slope.

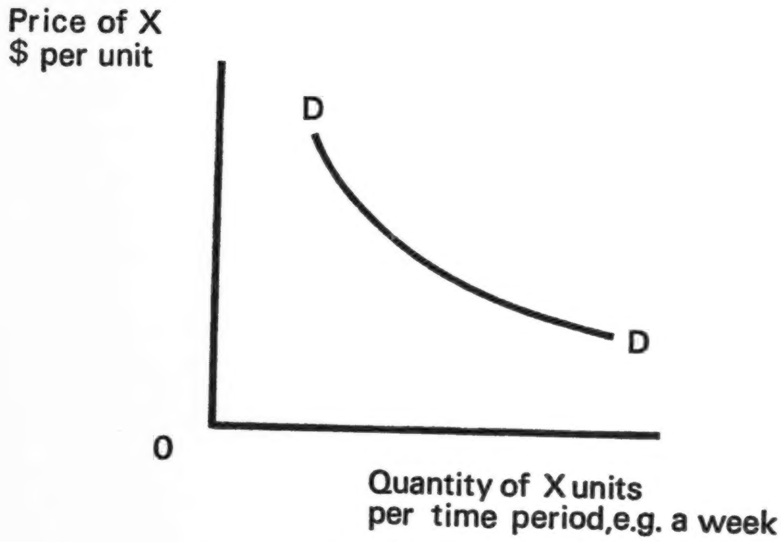

Figure 1A-1

In Figure 1A-2, we note that there is a wide variety of possible demand schedules. The curves D_0D_0, D_1D_1 and D_2D_2 depict three of the numerous possible demand schedules for good X. The curve D_0D_0 implies that purchases of X tend to be fixed at an amount OD_0 and are unresponsive in amount to variations in the price of X. Such a demand schedule is said to be "perfectly inelastic", to indicate the lack of response of quantity purchased to price changes. At the other extreme is the curve D_1D_1 which would apply in the rather unlikely case where at a price of $\$OD_1$ per unit, purchasers would buy any amount from zero to infinity. At any price of above $\$OD_1$ per unit, purchases will drop to zero and at any price less than $\$OD_1$ per unit, an infinite amount would be purchased. We call this sort of demand curve a "perfectly elastic" demand curve, to indicate the strong responsiveness of quantity demanded to very slight price changes. More typical of most situations are demand schedules such as D_2D_2 which show an inverse relationship between the price of X and quantity demanded of X. Of course there are numerous possible demand schedules, all of which have the negative slope of D_2D_2. The responsiveness of purchases to price changes (that is, the elasticity of demand) changes from position to position on a given demand schedule.[32]

The discussion of demand thus far applies to both product and factor markets. At this point it is necessary to distinguish between the two types of markets. We will first examine the

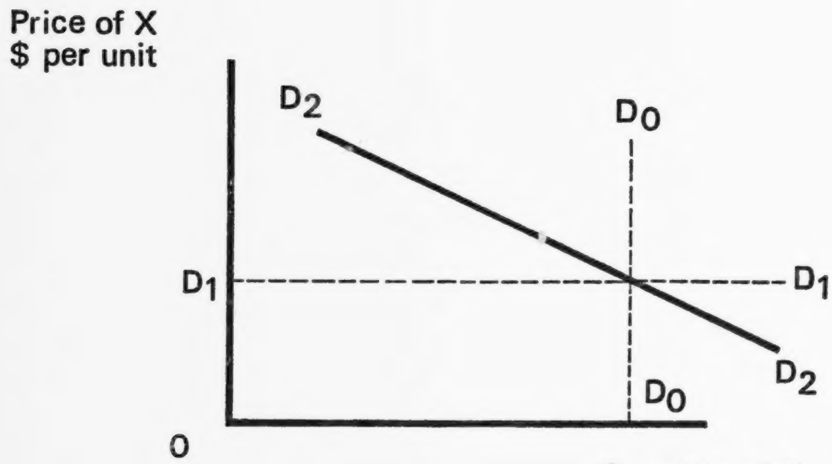

Figure 1A-2

forces underlying demand in product markets and then turn to factor markets.

Earlier we stated that the demand schedule *DD* in Figure 1A-1 indicated the quantity demanded of *X* at various possible prices of *X* *ceteris paribus*. Just what are the other factors which are assumed to be unchanged? In product markets, a given household's demand schedule is applicable provided the household's tastes, incomes and the prices of other products (especially products that are used along with *X* or which can be substituted for *X*) are constant. If any of these change, there is likely to be some change in the household's demand schedule for *X*. Thus a rise in the income of a household will raise its demand for most (but not all) goods as indicated by the shift from D_0D_0 to D_1D_1 in Figure 1A-3. That is, at each possible price more will be purchased after the income boost than was purchased before the rise in incomes. Similarly, a rise in the price of substitutes for *X* or a fall in the price of complementary goods will raise the demand for *X*. Obviously a shift in tastes in favour of *X* would have the same result. The household's demand for *X* would move in the opposite direction (that is, from D_1D_1 to D_0D_0) if prices of substitutes fell, if prices of complementary goods rose, if tastes changed in a way unfavourable to *X* and (in most but not all instances) if income fell. Similarly, the total market demand schedule for *X* assumes that consumers' tastes and incomes, other product prices and the number of households in the market remain unchanged. Changes in these will account for shifts in the market demand schedule for *X*.

Labour Demand

The demand for a factor of production such as labour is subject to somewhat different influences. The factor is not purchased for its own sake as a means of direct satisfaction of household wants. Rather it is purchased in order to produce goods and services which are bought by households. Thus labour demand is a *derived demand* — that is, it is derived from and therefore related to the demand for the products made with labour. Furthermore, the production of goods and services involves the combination of various factors including labour (or more accurately, including different kinds of labour) within firms. The combination of factors used by a given firm depends on the state of technical knowledge, the time available for adjusting the factor mix, the relative prices of factors and the level of output which the firm seeks to produce. All of these combine to influence the level and shape of the demand schedule for labour. In general, the greater the inelasticity of demand for products made with labour (or with a given type of labour) the more inelastic is the labour demand schedule. Also, the less the technological possibility of using labour substitutes, or the lower the relative price of factors complementary with labour in production, or the shorter the time period available for adjusting

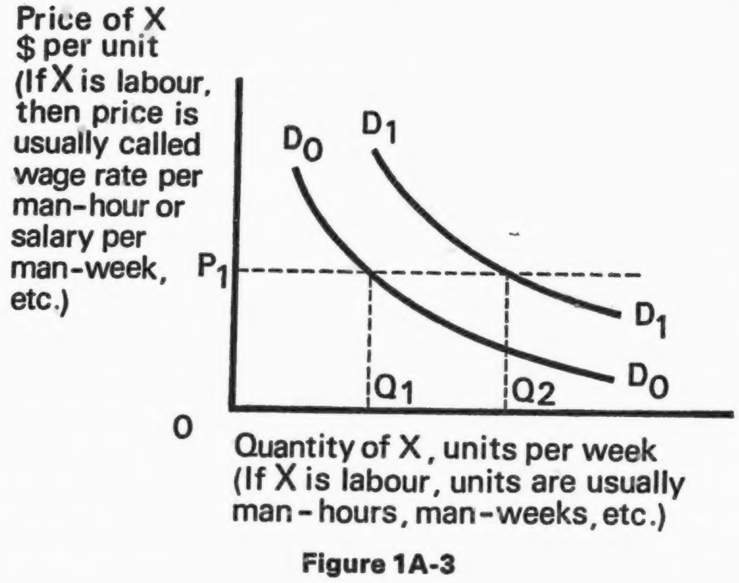

Figure 1A-3

productive processes, the more inelastic will be the demand for labour or for a given type of labour.[33]

A rise in product demand usually means a rise in the demand for labour and for other factors. However, the increase in factor inputs need not be proportionate with the rise in product output. Indeed, it is possible that the input of some factors (including labour) could vary inversely with product output at least over some range of possible product outputs.[34] A rise in the price of a labour substitute would tend to raise the demand schedule for labour, moving it upward and to the right as shown by the shift from D_0D_0 to D_1D_1 in Figure 1A-3. That is, at each wage rate firms would now hire additional workers or employ existing workers for longer hours. A fall in the price of a labour complement would tend to have a similar effect. Technological changes will alter factor proportions, but no general rules can be spelled out on their impact on the demand for labour.[35] Each case requires separate study. The same uncertainty prevails with regard to the impact on labour demand of altering the time period under consideration. When the firm has more time available to alter its mix of factor inputs in response to changing factor prices, it may choose to employ a mix using more, less or the same amount of labour.[36]

The Government and Labour Demand

The state influences labour demand in a variety of ways unrelated to its specific manpower policies. Governments can use monetary and fiscal policies to alter the level of aggregate demand for goods and services and thus for labour. They also are large employers and in this capacity they can readily influence the composition (by region, occupation and industry) as well as the level of labour demand. Finally, government tax and subsidy programs alter the relative product and factor prices in the market so as to exert an influence on the composition of labour demand.[37] In some cases the labour market impact is only an incidental side-effect of desired fiscal or product mix goals. In other cases, the resulting labour market changes are the principal target of the government programs.

Labour Demand: A Summary

In summary, the level of demand for labour or for a given type of labour at any price will change in response to the following:

(1) Changes in the demand for products made with this type of labour.
(2) Technological change.
(3) Changes in the prices of factors that are complementary with or substitutes for this type of labour. This would include other types of labour.

The greater the time for adjustment to such changes, the greater the shift in labour demand.

Much public discussion has focussed on one of these factors, namely the impact of technological change on the demand for various kinds of labour. It is therefore important to note as well the role played by such other forces as events in other markets, both product and factor markets, on labour demand. When we distinguish among various types of labour, then it is clear that the demand for each type is subject to changes originating in other labour markets, in other factor markets, in product markets and in the state of technical knowledge.

B. LABOUR SUPPLY

The Concept of Supply

The treatment of supply is analogous to that of demand. Once again the definition of supply relates the quantities of a commodity *X* that will be offered to the various possible prices of *X*, *ceteris paribus*. A supply schedule is illustrated in Figure 1A-4 by the line *SS*.

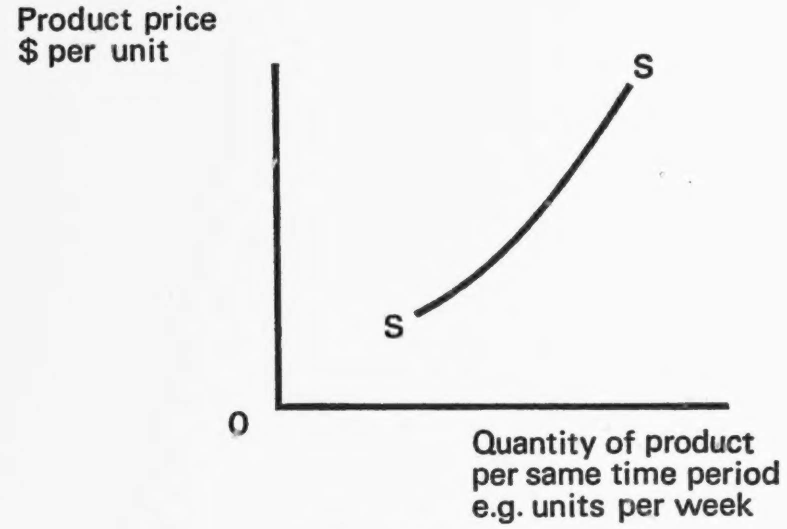

Figure 1A-4

The supply schedule generally has a *positive* slope, reflecting the fact that usually the higher the price the greater the willingness of suppliers to offer the commodity for sale. In Figure 1A-5 we note that there are numerous possible supply schedules of varying elasticity ranging from the perfectly inelastic schedule S_0S_0 (where price changes have no impact on output) to the perfectly elastic schedule S_1S_1 (where output will vary enormously with the slightest change in price from the level of *OS*), with numerous other possible curves of intermediate elasticity such as S_2S_2.[38]

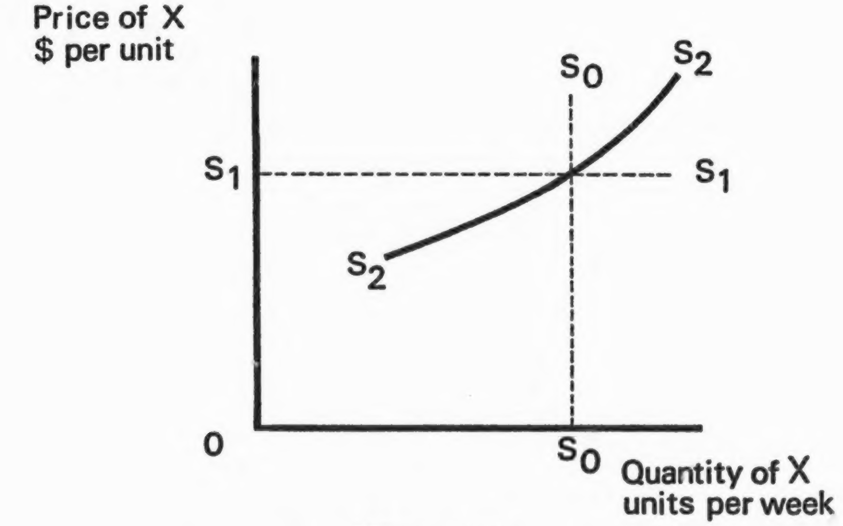

Figure 1A-5

In product markets, the firm's decision to supply is based on a comparison of the increment to revenue and to costs of each additional unit it might decide to offer to the market. The industry supply schedule[39] is the sum of the schedules of the firms in the industry in the short run. The short-run period by definition precludes the entry of new firms. If the time period under consideration is extremely short so that the output decisions of the existing firms cannot be changed at all (for example, a perishable agricultural crop that has been harvested and brought to the market), then the supply schedule will approximate S_0S_0 in Figure 1A-5. With a longer time period, the short-run supply schedule will usually look more like S_2S_2 in Figure 1A-5 reflecting the possibility of output changes by existing firms, even though by definition the entry of new firms is impossible.

In the long run, however, when entry is possible and firms can leave if better opportunities are available elsewhere, the industry supply schedule will often look like S_1S_1 in Figure 1A-5. This assumes that at the price $\$OS_1$, firms can make "normal" returns on outlays of time, land and capital in this industry ("normal" is defined as equal to what is possible elsewhere). It also assumes that all actual and potential producers have similar cost curves and that the size of the industry has no impact on the costs of individual firms. The price will not rise without attracting infinite entry because of the presence of super-normal profits at higher prices, nor will it fall without inducing exit as firms turn to better opportunities elsewhere.

Clearly, the time period under consideration is of critical importance in establishing the position and shape of the supply schedule. In general the longer the time period available, the more elastic will be the supply of the good or service. Other factors are also operative. The firm weighs costs against revenue in formulating its supply decisions. A given supply schedule applies only as long as costs are unchanged. If the price of factors of production (including labour) increase, then the supply schedule of the firm (and thus of the industry) will decrease or move upward and to the left as shown by the move from S_0S_0 to S_1S_1 in Figure 1A-6 (that is, at each price, less will be offered for sale).

On the other hand, a fall in the price of some factor or

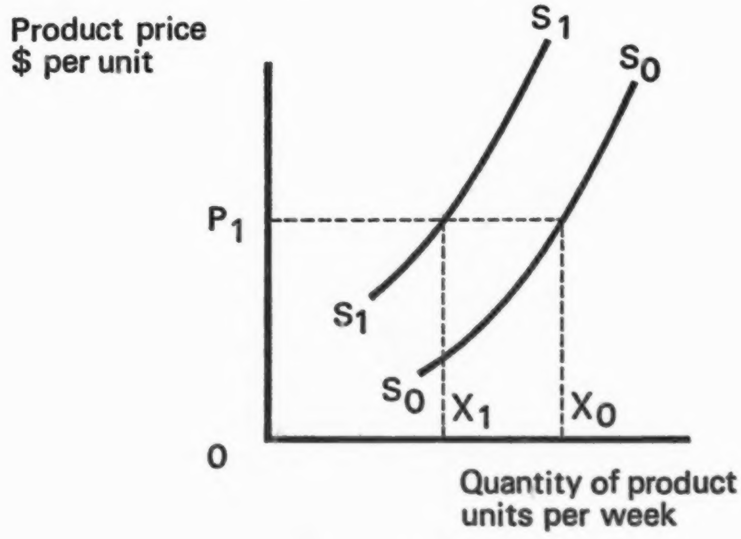

Figure 1A-6

factors will increase the supply—that is, move it to the right from S_1S_1 to S_0S_0 in Figure 1A-6. Similarly, a technological change will lower costs and thus also cause an increase in supply. It should be clear that the supply decisions of firms in the markets for goods and services will feed back into factor markets influencing the level of factor demand. The reader will note that the same forces influence both the amount of *product supply* and the amount of *factor demand*. Both are determined by technology, factor prices and the level of product price (which in turn reflects the nature of product demand). This interrelationship among markets, both product and factor markets, is extremely important in both formulating and assessing manpower programs, as we shall explain later.

Labour Supply

The supply of factors differs considerably from that of goods and services. Perhaps most unique of all factor markets is supply in the labour market. Workers, in deciding on whether or not to work and how much to work, do of course look at wage rates, but the relevant "costs" are not solely the monetary costs of producing workers analogous to those which influence the output of firms. If this is true of the decisions of existing workers, it is even more critical in assessing the influences on the birth rate and population size which determine long-run changes in labour supply.

The subject of labour supply is rather complex. The interested reader can refer to one of the numerous labour economics textbooks for a complete treatment.[40] In this paper the comments will be limited to a few of the considerations which are most critical in the decisions on manpower policy.

In treating labour supply, we must distinguish among various relevant supply schedules by asking whose labour supply and the supply to whom we are concerned with.

The Household Labour Supply

Since labour is supplied by human beings, we must look to the forces which operate on the individual in determining his decisions on how much, if any, labour to offer to the market. Most economists feel that the family rather than the individual is the appropriate unit for study, since the work decisions of the

2

various family members are interdependent. The family must decide how to divide the time of members of the household between income producing and non-remunerative activities. In the latter category we include among other things leisure, time spent on formal education and the hours devoted to household chores. In our society all family members enjoy considerable leisure; children and youth typically spend time on education; wives (particularly those with young children) often work at home rather than at paid employment, although a rising proportion of married females are entering the labour force; and finally most men and single women (particularly those ages 20 through 65) work for remuneration, although they also devote considerable time to unpaid activities.

Members of a household, in deciding both whether or not to seek employment and how many hours of employment per week they wish to offer, must weigh the relative importance of income, leisure and non-remunerative activities such as education and work in the home. Another hour at work means more income, but at the expense of time available for other uses. The higher the wage rate offered, the greater is the income foregone during each hour of non-remunerative activity.

This would lead one to expect that the higher the wage rate, *ceteris paribus*, the greater the number of hours that would be offered. In fact this often happens. However, as wage rates rise, workers will see that at the higher wage rate, they can maintain or even raise their incomes while working *less* hours and enjoying more leisure. They *may* therefore choose to work *less* hours as wage rates rise at least over some range of possible wage rates, and there is some evidence for this as well.

Also relevant are the "normal" or "standard" hours of work in available jobs. Most jobs do not permit workers free choice on working hours but rather impose more or less rigid schedules of hours. However, worker choices between labour and non-remunerative employment can to some extent find expression in the choice of part-time or seasonal work, in moonlighting, in the choice of overtime work when available or in seeking employment where there is the opportunity for high earnings because long work weeks are possible.

Finally, the ease of finding employment will also influence the decision to seek employment. The costs of search for employment, both monetary costs and time lost for non-remunerative activities, are inversely related to the level of job vacancies. Thus one would expect participation rates[41] to rise when jobs are plentiful and to fall when jobs are scarce.

These and other factors influence the participation rates of various family members in differing ways. It is well known that prime age males and single adult females appear willing to work almost irrespective of the wage rate offered. It is not clear how they respond immediately to a wage change in terms of hours worked, but historical experience suggests that over time as wage rates rise, the hours worked by this group (per week or per year) falls. The aged appear to be influenced by the availability of job opportunities[42] and the nature of social income maintenance programs, as well as by wage rates. Youth also responds to job opportunities, although social attitudes and legislation on school attendance are very important. Married women appear to be influenced by social attitudes toward working mothers, the ages of children in the family, the size of family income, the availability of jobs particularly of those jobs with flexible or short hours, the cost of reducing housework through hired labour or gadgets, and their education, as well as by the wage rate they can obtain in the market.[43]

These remarks are based on available empirical evidence on participation rates of the various family members and are consistent both with our earlier discussion of the choices between income, leisure and other activities which individuals must make in allocating available time and with reasonable expectations concerning maximization of well-being in a society with our kind of male, female and youth roles.

The Supply of Labour to the Nation

We have already considered a major factor determining the number of workers and working hours available to the nation in our examination of the household's decision to supply labour. The national labour supply is determined by the size of the population and its composition and more specifically by the number of households, the age—sex—marital status of the household members and how household members choose to use their time. The size and composition of the population at any time in turn is a result of the population base, birth rates and death rates in the past, and immigration and emigration rates.

While wage rates and income levels may play some role in these matters, other factors such as social norms on family size, public policy on immigration and economic and political conditions in other nations appear to be even more critical.[44]

But these are not the only important variables. As well as the number of "bodies" that offer themselves to the market, one must also consider the number of hours per day, week, year and so on that each worker is prepared to work. This is a function of custom, legislation and employer decision, as well as of conscious worker choice. Finally, there is the matter of the quality of the labour force as measured by its education, skill attainments and other factors influencing its efficiency. The more efficient the labour force, the greater the output from a given period of work and in that sense, the greater is the labour supply measured as it ideally should be in homogeneous "efficiency units" of labour rather than in man-hours. Worker efficiency in turn is a function of a number of factors such as health, education and training, the standard work period, morale and so on. These factors are partly dependent on wage rates but custom, medical knowledge and legislation are also important.

The Supply of Labour to an Area

The determinants of labour supply to a region within a nation are similar to those factors influencing the national supply. Population size and composition (by age and sex) are the critical factors and in turn these are dependent on regional birth, death, inmigration and outmigration rates. The major difference here is that whereas movement into (and in some cases out of) a nation is controlled by legislation as well as by economic and social conditions, interregional migration within nations is usually the free choice of citizens. Furthermore, interregional movement within a nation *usually* involves less in the way of cultural and social changes than does international migration. It also *generally* involves a lower expenditure on transportation than does international movement. If the worker changes his mind, it is usually cheaper to return home than it is for international migrants. If the "present discounted value" of the expected stream of earnings gains[45] resulting from movement does not at least equal the current cost of moving, then no movement can be anticipated even where interregional wage variations exist. Where moving costs are nominal, then even a small wage differential may be expected to induce labour mobility, *ceteris paribus*. Thus interregional wage differentials are more likely to result in labour mobility from low to high earnings regions than are similar international income differentials.

For differentials to induce mobility, they must be differentials in "real" wage rates. Thus, if there are persistent regional differences in living costs, no mobility is expected—unless in the area with a high cost of living, wage rates are enough above those in other regions to more than offset this difference. There is also a tendency for geographic preference or loyalty which must be offset by the wage differential in order to induce mobility.

Labour Supply to an Occupation

In an industrialized society, workers can choose from a variety of occupations. Economists argue that relative wage rates will be a major consideration in this choice since people presumably will prefer a higher to a lower wage rate, other things being equal. However, market price is only one consideration. One must weigh the relative "costs of production" as well as relative market prices in deciding on where to sell and what to sell in any market (including the labour market). Thus workers are assumed to consider the time, effort and cost of education and training in acquiring a given skill as well as relative wage rates in deciding on the skills to acquire and the jobs to work at. Wage differentials may not induce an influx of workers to high paying jobs in cases where workers feel that the cost of training (including outlays for tuition and earnings foregone) exceeds the discounted value of the expected earnings differential during the worker's future period of employment.

Labour differs from other commodities in that the service bought and sold resides in the man selling it and is inseparable from him. Workers are keenly interested in the way in which their labour is used—in such matters as the physical surroundings, the intensity of use, the atmosphere on the job and so on. These non-wage factors are also important in determining worker choice. They are, however, inherently difficult to measure. Furthermore, workers differ in their assessments of these factors. This makes prediction of worker behaviour most difficult.

To sum up, workers are expected to consider wage differentials in making occupational choices. However, if this were the only factor, then wage rates would not be identical but the sizeable occupational wage differentials which are characteristic of the labour market could not exist. In choosing their occupations workers are not trying to maximize the wage rate but rather to secure the largest "net advantage" in their jobs. This means that differences both in costs associated with training and in "non-wage" characteristics of various jobs[46] must be considered along with wage differentials in assessing the occupational distribution of labour supply.

The Supply of Labour to a Firm or Industry

Economic theory has little to say about the supply of labour to a firm or industry apart from what has been said about national, regional and occupational supplies. Workers are assumed to move freely from firm to firm with occupational and regional loyalties playing a greater role in job choice than either employer or industrial attachment. Firms are able to draw on the supplies of various types of skills available in the regions where they are located. They must be prepared to pay the "going rate" in the region for any given skill. Where the firm is the sole buyer of a given type (or types) of labour, it will determine the "going rate". In general, such a firm will have to offer higher wage rates when it wishes to attract additional workers away from other employers, occupations and regions.

While labour supply to the firm or industry is generally treated as part of the subject of regional or occupational supply, there are some factors which justify special treatment. The definition of an occupation is not clear-cut, and the way in which a given skill is used will vary among firms and industries. This often means some variations among firms in the required skill for any given occupation.

The problem of establishing a clear-cut definition of an occupation could be handled by attempting to define an occupation as including only identical types of skill identically utilized. But this would mean that we would have to multiply the already large and cumbersome number of occupational categories now in use.[47] To avoid this the accepted practice is to recognize the variation of both skill and skill utilization within an occupation and to acknowledge the possibility of some interfirm or interindustry wage differentials for a given occupation, even within a given region, which would not call forth sufficient mobility to produce wage uniformity among employers.

To this must be added the fact that firms and industries differ greatly in other "non-wage" elements of employment. We have noted earlier that these are expected to result in compensating wage differentials. Thus, for example, a secretary working in an insurance company works in clean, pleasant surroundings with many others who share her occupation, whereas a secretary working in a scrap metal yard is in a rather different sort of environment. Also, industries and firms differ in status within society and workers may be willing to accept lower earnings to work for high status rather than low status employers.

Finally, many firms divide jobs into two categories. Some positions tend to be filled by internal mobility, that is by upgrading or transferring existing staff to these jobs when openings develop. Others are filled by drawing in new employees from outside the firm. This further complicates job comparisons, since prospective workers and employers in assessing one another may look not only at the immediate job opening but at the potential for career development in a sequence of jobs in the firm.[48] It also means that the external market will play a direct role in allocating labour in only some occupational categories with little influence in others.

The Government and Labour Supply

Many government policies whose primary purposes are not always directly related to manpower allocation tend to exert a significant influence on both the level and composition of labour supply. State action can strongly influence the size and age-sex distribution of the population through policies on immigration, emigration, medical care, family allowance payments, birth control, abortion and so on. Participation rates are influenced by these policies and also by legislation on such matters as compulsory school attendance, minimum wage rates, hours of work and pensions. Thus the size of the aggregate labour force is subject to strong state influence.

The occupational composition of the labour force is influenced as well by immigration and emigration policies, particularly where selective controls related to skill level are exercised. State decisions on the level and allocation of education and training expenditures also exert a strong influence on the occupational structure of the labour force. While governments are giving heavier weight to the manpower implications in formulating public programs in these areas, other considerations—such as the impact of immigration on the ethnic structure or the value of education in the cultural development of our citizens—continue to play an important role.

Numerous other government programs undoubtedly operate to influence labour supply. Thus, for example, the granting of unemployment insurance benefits to seasonal workers tends to raise the supply of such workers above what it would otherwise be.[49] Government income maintenance programs may reduce the labour supply, particularly the supply of groups such as widows and the aged.

Labour Supply: A Summary

In the treatment of both labour demand and labour supply, the heterogeneity of workers and of jobs must be reckoned with. This is usually accomplished by treating the labour market not as a single market but as a series of separate albeit interrelated markets distinguished by occupation, skill and geography, and to a lesser extent by industry and firm. Heterogeneity is thereby reduced, but considerable differences remain within each submarket. Nonetheless, this appears to be the most appropriate way of balancing between the desire for a reasonable degree of homogeneity within what is defined as a market and the necessity of limiting what are considered to be distinct markets to a manageable number.

Where homogeneity is of great importance, one can use narrowly defined occupational and regional categories. However, this means that the number of separate markets which must be considered increases. Where we wish to reduce the number of labour markets under consideration, then broader occupational and regional definitions are employed which of course embrace a greater variety of workers and jobs and hence yield less precision in the analysis.

The decision of the existing household member to supply labour to the market is conditioned by a host of factors apart from the level of wage rates, although the latter is by no means unimportant. Also, the household's decisions on expanding family size (and therefore adding to the potential labour supply) appear to have little to do with the rate of monetary return over monetary cost. (In our society people seldom expect to augment family income through the future earnings of their children.) Immigration and emigration rates do appear to be influenced by international wage rate comparison, but legislation and political and social conditions here and abroad also play an important role. Thus the determinants of the overall national labour supply depend on numerous forces in addition to those normally considered by economists.

When we come to the subject of the supply of specific kinds of labour distinguished by skill, region and industrial attachment, the tools of the economist are more readily applicable. We assume that labour moves among occupations, regions and firms in response to shifts in relative wage rates. The supply of labour to one occupation, region, industry or firm is markedly influenced by wage movements elsewhere, particularly in those other markets to which these workers can move and from which new workers can be drawn. This is not to deny the role of important non-wage factors such as the personal satisfaction derived from a particular type of work, or from a given place of residence, or from a relationship with a given employer. These factors may prevent the wage structure and the distribution of employment from achieving the precise equilibrium which a focus on economic variables alone would dictate should prevail. What is suggested here is that the *direction* of wage and employment shifts does reflect economic forces, and also that the non-economic factors are unlikely to prevail over the economic forces at least in the long run. More will be said about this subject in the papers that follow.

NOTES AND REFERENCES

[1] This term is explained in the appendix.

[2] See Lester, R. A., *Manpower Planning in a Free Society*, Princeton University Press, Princeton, 1966. The notion of mismatch-

ing the market provides the rationale for extensive manpower retraining, manpower relocation and other programs undertaken recently in Canada, the United States and elsewhere.

[3] See Lester, R. A., *ibid.*, p. 135. Also Killingsworth, C., "Statement Before the Senate Committee on Employment and Manpower", reprinted in Bowen, W. G. (ed.), *Labor and the National Economy*, Norton, New York, 1965, p. 134.

[4] Lester, R. A., *op. cit.*, pp. 177-178.

[5] The picture of the movement from unstable prices like $\$OP_1$ and $\$OP_2$ per unit to the stable price of $\$OP_0$ per unit presented here has been simplified. The path to the stable or equilibrium price may be more complex than this; and in some cases, market forces may pull away from, rather than toward, a price such as $\$OP_0$. What is presented here is adequate for present purposes.

[6] Thus a skilled worker would be assumed equal to "k" unskilled workers, a stenographer equal to "m" skilled workers and so on. While it is possible to conceive of such measurements, there is no easy way of actually weighting skills so as to compare them in terms of a common unit of measurement. Sometimes the relative efficiencies are approximated by using relative wage rates as appropriate weights. This method often is useful but it has certain deficiencies. In practice, either worker heterogeneity is ignored, or the matter is recognized by subdividing the market as indicated earlier.

[7] Note that price elasticity of supply is *not* measured by slope. Elasticity is the measure of a percentage change in quantity supplied for a given percentage change in wage rate. Slope measures the absolute change in the wage rate for a given absolute change in quantity supplied.

[8] The appendix elaborates on the concept of elasticity, as well as on the forces influencing demand and supply which are discussed in the sections following.

[9] We will apply the apparatus developed earlier to the problems of market interrelationship, since this is the only way to handle the discussion in an article such as this. In fact, these tools of "partial equilibrium" analysis may not be as suitable as those of "general equilibrium" models. However, the latter would involve an unduly complex apparatus.

[10] If we were able to treat "time" more carefully here, we would distinguish between short-run and long-run demand and supply schedules. The examples here would reflect the contrast between short-run and long-run adjustments rather than induced movements in the demand and supply schedules respectively.

[11] This is particularly true where these goods have relatively elastic demand curves.

[12] In the appendix perfect competition is defined. A modified model of perfect competition is developed which allows for heterogeneity of workers and jobs, as well as for costs of mobility.

[13] Note that this analysis also would apply in cases where legislation established a minimum wage rate above the competitive level in some markets. See Eastman, S., "An Economic Analysis of the Goldenberg Report", in *Canadian Journal of Economics and Political Science*, Vol. 30, No. 1, February 1964.

[14] Over time, this higher wage rate might encourage changes in production techniques so that even less workers are employed here. The displaced workers are forced to seek employment elsewhere, depressing wage rates in other markets which are not as strongly unionized.

[15] We are not concerned here with policies designed to insure adequate job opportunities. Throughout our discussion we have assumed that jobs are available for all who want work at the prevailing wage rates. Our focus has been on how workers are allocated and reallocated among jobs.

Some of the newly opened jobs may be filled by new entrants to the labour force. Some of the displaced workers may decide to leave the labour force rather than search for new employment. Such entry and exit to and from the labour force contributes greatly to adaptation to changes in relative demands for various types of labour.

Similarly, where demands change, so do relative wage rates. This causes a reassessment by employers of production and output decisions, which in turn often reduces the magnitude of employment shifts required.

[16] It should be noted that considerable migration has taken place from the Maritimes to Ontario but not enough to erase differentials in wage rates and unemployment rates.

[17] See Dunlop, J. (ed.), *The Theory of Wage Determination*, Macmillan, London, 1957, pp. 14-26 for an example based on Boston truck drivers. Also note the long-standing lower wage rates paid in the "sweated" industries, such as clothing and textiles, with relatively poor working conditions compared with higher rates and better conditions for comparable skills in other sectors, such as chemicals, steel and so on.

[18] Professor Winder's paper discusses this problem and cites some of the empirical studies which document the imperfect nature of information flows in this market.

[19] See Kerr, C., "Balkanization of Labor Markets" in Bakke, E. W., *Labor Mobility and Economic Opportunity*, Technology Press, Cambridge, 1954.

[20] There are numerous instances where this has occurred. For example, the training requirements for new lawyers and pharmicists in Ontario have been increased considerably over the past two decades, but no mandatory upgrading was imposed on those trained before the changes. Similarly, chartered accountants in Ontario will soon raise entrance requirements but will not alter the standards for those now in practice.

[21] Well-being is defined for each man (or family) by himself. No objective definition of well-being is implied here, except that *ceteris paribus* more income and/or more leisure are preferred to less income (or less leisure).

[22] A serious problem here is that assessment of benefits involves estimates of the future streams of income in alternative employments. Professor Drummond's article treats the subject of labour market forecasting. It should be noted that no one has yet devised a method of making defensible judgements concerning the relative income streams of alternative jobs over all or a significant part of a man's future working life. See also the articles by Professors Meltz and Stager in this volume.

[23] Thus the extension of unemployment insurance to seasonal workers has altered the income differential between seasonal and non-seasonal jobs inhibiting mobility out of seasonal work. Family allowances, pensions and eligibility rules for relief benefits may make living in depressed areas tolerable and inhibit outmigration to areas of greater employment opportunity.

[24] There is no objective way of measuring the two outputs in a way that makes them readily comparable. However, it is my feeling that society does place a greater value on remunerative work than on leisure and household work, at least for prime aged males.

[25] Canada, *Report of Industrial Inquiry Commission on Canadian National Railways "Run-Throughs"*, Queen's Printer, Ottawa, 1965.

[26] If there are suitable vacant jobs in a number of sectors or regions, then the impact suggested here is obvious. But what if there are no vacancies in Hamilton steel mills or elsewhere except in the copper mines? We have assumed that overall unemployment is low so that there are likely to be jobs open in a number of sectors other than copper. If not, then the presence of numerous vacancies in copper mines or clothing and not in other industries may simply mean that these industries have been slow in raising the wage rates and that public policy assists firms whose wages fail to rise in line with market forces.

If workers are simply given grants to move where they will, then administrative problems of ensuring that the money is not used to subsidize those with a yen for travel but with little interest in employment are enormous.

[27] There is also the fact that such programs, by altering the structure of wages and other factor incomes, change income distribution and thus could further change the composition of product demand.

[28] See Samuleson, P. A. and Solow, R., "Analytical Aspects of Anti-Inflation Policy" in American Economics Association, *Proceedings*, May 1960. Lipsey, R., "Structural and Deficient Demand Unemployment Reconsidered" in Ross, A. (ed.), *Employment Policy and the Labor Market, op. cit.*

[29] See Killingsworth, C., "Automation, Jobs and Manpower" in Bowen, W. G. (ed.), *Labor and the National Economy, op. cit.*

[30] Actually where supply curves shift rapidly in this way, this increases the elasticity of the longer-run supply schedule, so that the two sorts of supply adjustments are really the same.

[31] See also Mehmet, O., *Methods of Forecasting Manpower Requirements*, Ontario Department of Labour, Toronto, 1965.

[32] Elasticity is not the same as the slope. Elasticity is measured as the percentage change in the quantity demanded of X for a given percentage change in the price of X, whereas slope measures the absolute change in price for a given absolute change in quantity. For example, a reduction in price of butter from 75¢ to 50¢ a pound would likely result in a substantially greater quantity of butter demand. The same reduction of 25¢ for an automobile would certainly leave the quantity demanded unchanged. However, an identical percentage reduction of ⅓ would certainly increase the quantity of automobiles demanded.

[33] Thus, if the sales of salt vary little with price changes over a wide range of possible prices, then the quantity of skilled saltminers hired will tend to be stable over a wide range of possible wage rates. If there are no substitutes for skilled saltminers, this will tend to make the demand for them even less elastic, since when their wage rates rise the employers cannot turn to other factors. If the equipment used by a given group of workers is much cheaper than other equipment, it will be preferable to use these workers and machines than other kinds of workers with other kinds of equipment. Finally, when there is little time available to convert to other techniques of production, the wage rates of a given group of workers may rise considerably without much effect on employment.

[34] This would occur where as output changed, the firm found that it could produce the new output most cheaply by drastically altering its factor mix in a way that could result in the input of

some factors falling as output rose or in the input of some factors rising while output fell.

[35] See Professor Kotowitz's article in this volume.

[36] A more thorough treatment of labour demand would require a long technical treatment of the concept of marginal revenue product. Interested students may consult one of the many basic economics tests such as Brennan, *Theory of Economic Statics*, Chapters 19 and 21.

[37] If whisky is more heavily taxed than wine, this may induce some shift of consumption, which in turn feeds back on relative labour requirements raising the demand for grape pickers and other workers in the wine industry and lowering the demand for workers in the whisky industry and in such related sectors as rye farming and so on.

[38] Note that elasticity of supply is *not* synonymous with the slope of the supply schedule. Elasticity is measured by the percentage change in the quantity supplied for a given (small) percentage change in product price.

[39] This is applicable only in industries which approximate the conditions of perfect competition.

[40] See Reynolds, L.G., *Labor Economics and Labor Relations*, Prentice Hall, Englewood Cliffs, 1964, fourth edition, Chapter 13; Chamberlain, N., *The Labor Sector*, McGraw-Hill, Toronto, 1965, Chapter 17; and Woods, H. G. and Ostry, S., *Labour Policy and Labour Economics in Canada*, Macmillan, Toronto, 1962, Chapters 10, 11 and 12.

[41] The participation rate is a technical term denoting the percentage of the population or of a given group within the population that is employed or is actively seeking employment.

[42] With the decline of agricultural and other forms of self-employment, the job opportunities available to older workers have tended to diminish at the same time as longevity has increased. This in part explains some of the recent emphasis on income maintenance programs for the aged.

[43] See Kaliski, S., "The Relation Between Labour Force Participation and Unemployment" (unpublished mimeo); Bowen, W. G. and Finigan, T. A., "Labor Force Participation and Unemployment" in Ross, A. (ed.), *Employment Policy and the Labor Market, op. cit.*; Mincer, J., "Labor Force Participation of Married Women" in Lewis, G. (ed.), *Aspects of Labor Economics*, NBER, Princeton University Press, Princeton, 1962, pp. 63-97; Woods, H. D. and Ostry, S., *Labour Policy and Labour Economics in Canada, op. cit.*, Chapters 10, 11 and 12.

[44] For a full treatment of this subject including historical statistical data and projections see Woods, H. G. and Ostry, S.,

Labour Policy and Labour Economics in Canada, *op. cit.*, Chapters 10, 11 and 12; Caves, R. and Holton, R., *The Canadian Economy: Retrospect and Prospect*, Chapters 8 and 9.

[45] To compare the costs and benefits of such movement, one must look not at all future earnings but only at the amount by which earnings after the movement exceed what earnings would be without movement. Furthermore, these gains must be discounted by an appropriate rate of interest to ascertain their current value so that comparison with the current cost of movement is possible. For an application of cost-benefit analysis to education see Professor Drummond's paper in this volume.

[46] Non-wage characteristics include such factors as job security, physical environment, the status attached to a given job, job location, social contacts on the job and so on. Many studies confirm the importance of such factors to worker job choices. See, for example, Brown, *The Social Psychology of Industry*, Penguin Books, Middlesex, 1954.

[47] The 1961 census occupational classification lists 16,000 occupational titles divided among 273 occupational classes. See Professor Meltz' paper in this volume.

[48] See Lester, R. A., *op. cit.*, pp. 25-30, where the author expresses concern over the mobility-inhibiting impact of this practice.

[49] One side effect of this is that the extent of recorded seasonal unemployment is thereby greater than it otherwise would be, since more workers would likely remain in seasonal employment than would be there without these subsidies.

2

The Analysis of the Labour Market in Classical Economics*

Samuel Hollander

This chapter examines the contribution of the British "classical" economists to certain important issues relating to the operation of the labour market. A principal justification for such a study in this work is the hope that it will permit a sounder evaluation of current analyses by focusing attention upon the alternative assumptions which may be made in the treatment of the labour market. It will also provide some idea of the progress that has occurred over time in our understanding of economic processes.

The writers with whom we shall be mainly concerned are Adam Smith (1776), T. R. Malthus (1798), David Ricardo (1817) and J. S. Mill (1848).[1] The last important economist writing on the labour market within the framework developed by these authorities was J. E. Cairnes (1874). We shall also have occasion to refer to the contribution of other economists of the period.

We shall consider first the classical analysis of the process by which the *average wage rate and aggregate employment* are determined. Of related interest are the *sources of unemployment* recognized in the literature. We shall then turn to the classical treatment of the *wage structure* with special reference to the impediments to labour mobility between occupations. We shall see to what extent the classical writers were willing to rely on the market process to generate adequate supplies of skilled labour of various kinds, and to what extent it was recognized that some degree of *intervention by government* (particularly in the financing of vocational education) was necessary. Finally we shall turn to the *classical attitude toward trade unions*. Our main concern in this regard will be whether or not the classics envisaged some ability on the part of organized labour to raise working-class living standards.

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CLASSICAL THEORY OF LABOUR SUPPLY

Long-run Subsistence Theory

A distinguishing feature in much of the classical literature is the treatment of the supply of labour in a manner identical to that of the supply of commodities. The output of commodities, in competitive markets, reacts to prices which exceed or fall short of production costs, and similarly, it was argued, the supply of labour reacts to real wage rates which do not coincide with the "costs" of producing labour. This approach was incorporated by Adam Smith into the *Wealth of Nations*:[2]

> Every species of animals naturally multiplies in proportion to their means of subsistence, and no species can ever multiply beyond it. But in civilized society it is only among the inferior ranks of people that the scantiness of subsistence can set limits to the further multiplication of the human species: and it can do so in no other way than by destroying a great part of the children which their fruitful marriages produce.
>
> The liberal reward of labour, by enabling them to provide better for their children, and consequently to bring up a greater number, naturally tends to widen and extend those limits.[3]

To argue that the labour supply tends to respond to relatively high real wage rates, namely rates in excess of "subsistence", does not necessarily imply a belief that in practice the wage rate is driven down to the minimum. If changes in the demand for labour occur at a rapid pace compared with the reaction of population, the actual wage rate may for substantial periods, and even indefinitely, exceed the minimum. Thus in Smith's work there is considerable optimism regarding the actual wage rate. However, T. R. Malthus[4] introduced into the literature his celebrated propositions regarding the relative growth capacities of population and the food supply, according to which the working-class population when unchecked is capable of increasing at a faster rate than the maximum conceivable rate of growth of food. Since farm produce played a major role in the working-class budget, a severe constraint was imposed upon the extent to which the demand for labour in *real* terms might rise relatively to the supply. Consequently, Malthus argued, except for very brief periods, the living standard of the worker would be under constant pressure toward the subsistence rate.[5]

It is true that David Ricardo, upon occasion, admitted that wages might for "indefinite" periods persist above subsistence,[6] but it is clear that he did not believe such an eventuality to be likely in the England of his day: "Although, then, it is probable, that under the most favourable circumstances, the power of production is still greater than that of population, it will not long continue so; for the land being limited in quantity, and differing in quality, with every increased portion of capital employed on it, there will be a decreased rate of production, whilst the power of population continues always the same."[7]

Any level of population can be maintained at its current size if the actual wage rate equals the subsistence rate, for in this case the "price" paid for labour is exactly equal to the "costs of production" of labour. Since wage rates which diverge from subsistence were considered to be temporary only, and soon corrected, Ricardo emphasized the long-run relationship between the subsistence rate and the working-class population. Technically, he obtained in this fashion a perfectly elastic labour supply function.[8]

A long-run function which reflects the notion that labour supply is infinitely expandable at a constant wage rate played a key role in Ricardo's analytical structures. For example, it was argued that rising food prices—which, because of diminishing agricultural returns, accompany an expanding economy—will be ultimately followed by rising money wages to prevent a permanent reduction in the purchasing power of the worker's budget. Similarly, taxes imposed upon wage income cannot be permanently borne by the worker and, accordingly, the burden will be finally passed on to his employer. These results flow directly from the assumption that the worker in the long run may be presumed to be earning the subsistence rate of wages.[9]

The propositions which we have been discussing are not very meaningful, however, unless greater precision is given to the concept of "subsistence". We have implied thus far that the subsistence level was constant over time. This indeed appears to be the correct interpretation to place upon the work of Malthus. On the other hand, Smith was careful to define "necessary" as distinct from "luxury" commodities to include "not only the commodities which are indispensably necessary for the support of life, but whatever the custom of the country renders it indecent for creditable people, even of the lowest order, to be without".[10] Ricardo, too, was careful to specify that the "subsistence" minimum should be defined in cultural rather than in biological terms. But the recognition that the minimum wage must be expressed in cultural terms implies that it is subject to variation over time: "It is not to be understood that the natural price of labour, estimated even in food and necessaries, is absolutely fixed and constant. It varies at different times in the same country, and very materially differs in different countries."[11]

Yet the concept of a population reaction to a difference between the current wage and some particular minimum wage may still be useful, even when it is admitted that the so-called "minimum" is subject to change.[12] There are grounds upon which an economist might base his continued use of the Malthusian reaction pattern. If the determinants of the minimum wage and its changes are "exogenous"—that is, are generated outside the economic system—and in particular are not played upon by the variables which are under investigation, then for purposes of analysis it may be justified to continue to argue, as a first approximation at least, as if the minimum were actually constant over time. This is particularly true when in the examination of a particular problem there is no obvious reason to expect a change in cultural habits and expectations. Any change in the cultural minimum may then be allowed for as a qualification. Clearly the relevance of the assumption depends upon the problem under discussion.

Thus Ricardo made use of the Malthusian principles of population and, as we shall see, these principles played an extremely significant role in the work of J. S. Mill.[13] The Malthusian mechanism remained relevant to the leading classical economists, despite a clear awareness that the minimum level was actually subject to change.

However, within the classical school a highly critical literature developed. In the first place, when the "subsistence" level is recognized to be in principle subject to change, the assumption of stability cannot be made if one's object is to forecast the future real wage rate. Evidently in this case the determinants of the cultural minimum cannot be ignored even temporarily. But apart from this general objection there were many who denied specifically and categorically that the concept of a population reaction to wage differentials was significant. For example, it was argued by S. M. Longfield that there did not exist a minimum wage which remained stable even over short periods: "The expense of supporting the labourer in that style which he has been accustomed to consider indispensable to his decent subsistence, has no effect on regulating the rate of his wages. The mode in which he usually lives is dependent upon the amount of wages he usually receives, and not the latter on the former."[14] This argument implies that the worker quickly comes to regard his current earnings as the minimum which henceforth he will find acceptable. J. R. McCulloch pointed out that in fact adequate time will be provided for a change in expectations to develop because of "the impossibility which usually obtains of speedily adjusting the supply of labour proportionally to variations in the rate of wages".[15]

A somewhat different objection was expressed by N. W. Senior, who attributed to the working class a degree of foresight and ambition which assured that restraint would be exercised in a deliberate attempt to raise living standards: "The great preventive check is the fear of losing decencies, or, what is nearly the same, the hope to acquire by the accumulation of a longer celibacy, the means of purchasing the decencies which give a higher social rank."[16] There is accordingly no significant difference between the behaviour of the working class and that of other classes in society.

It is important to keep in mind that, according to the argument of Longfield and McCulloch, it is the actual increase of wages which causes an upward movement in the cultural minimum. By contrast, according to Ricardo and J. S. Mill, any change in the cultural minimum will be brought about exogenously. We return to this distinction in a subsequent discussion of the classical theory of long-run wage-rate determination.

Short-run Labour Supply

The short-run labour supply function refers to the supply of labour services offered by a *given* work force at alternative real wage rates. For those economists who questioned the received theory of subsistence wages, the problem of wage-rate determination in the short run—when the population is constant—and in the long run—when population has time to vary—became inextricably entwined. But even those orthodox writers who emphasized the long-run supply function paid some attention to the labour market in the short run, since the mechanism by which the minimum wage rate is attained implies a process of movement in the short-run demand and supply functions.

The classical theorists had little constructive to say about the reaction of a given work force to variations in the wage rate. It was in fact usually presumed that the number of hours worked by each man per period of time was constant, thereby excluding changes in the choice between labour and leisure as the wage rate altered. Moreover, movements into and out of the work force, such as transfers between the labour force and self-employment or between worker and employer status, in response to job-pay opportunities were largely neglected. In brief, it was usually taken for granted that in the short run the labour supply curve was of zero elasticity; labour had no "supply price" and would accept any rate of wages, however low, should circumstances require it.[17]

CLASSICAL THEORY OF LABOUR DEMAND: THE WAGES-FUND THEORY[18]

It is frequently stated in the classical literature that a specific annual real wages bill is "destined" to be paid out to labour; accordingly aggregate annual labour income should be treated as a constant.[19] This immediately implies that the demand curve for labour will be of unitary elasticity so that, for example, a ten per cent reduction in the real wage rate will lead to a ten per cent increase in the quantity of labour services demanded, thus assuring that the real wages bill remains unaffected.

In this section we shall consider in some detail the notion of a "fixed" aggregate wages bill; the implied relationship between labour productivity and the wage rate; the implied technological relationship between labour and other factors of production required in the production process; and finally the motive which leads employers to raise their demand for labour upon reductions in the real wage rate.

The Concept of "Rigidity" of Aggregate Wages

In the simplest classical models capitalists were envisaged at the close of each year as being in possession of the entire national product emanating during that year. Capitalists might devote the accumulated product to one or more of three broad categories: during the ensuing year they might simply consume the product; or as a special form of consumption they might employ menial servants therewith; or they might devote the product to "investment" purposes by using it to finance wage payments to industrial labour, with the expectation of receiving at the close of the year a national product sufficient to reimburse all paid-out expenses and also yield a "surplus". Accordingly, consumption by workers and others during any period—that is, the *annual flow of real income*—derives from a *stock of past produce*. Once the decision has been made regarding the personal consumption of capitalists, the remainder of the stock of available goods will be devoted to wage payments. This latter portion of the past produce is referred to as the "wages fund". The general picture of the economic process which we have outlined is perhaps appropriate to a predominantly agricultural economy: here, the annual product is forthcoming in "jets" at harvest time, so that immediately after the harvest, assuming that opportunities for storage over several periods are negligible, the wages fund is obtained once the deductions for non-wage earners have been made. A further implied assumption is that capitalists do not hoard saved income.

However, even on the assumption that storage is ruled out, it would appear that we have obtained merely the maximum size of the wages fund. For why cannot capitalists alter their own consumption pattern during the ensuing year? Much has been written regarding the possibility of variation in non-wage earners' consumption during the year to finance increased consumption by workers. It is sometimes said that the classics believed such variations to be "impossible": once the decision has been made regarding the size of the wages fund, it is not possible to alter it. But it is difficult to justify the view that the wages bill *cannot* be altered.[20] A more generous and accurate interpretation of the classics attributes to them the view that the size of the wages fund is what it is at any time because capitalists have reached the decision, based on their profit expectations and their own propensity to consume, that this is the equilibrium sum to be devoted to wage payments. Capitalists might, if they so desired, reduce their personal consumption and devote more to wage payments, but they would not then be satisfied with the result.[21]

In more sophisticated discussions to be found in the classical literature, employers are sometimes envisaged as paying out money wages which are then used by labour in the purchase of commodities currently being produced. But in this case it is particularly difficult to appreciate why an increase in the flow of currently produced goods available to labour should be "impossible". There would seem to be little justification for a contention that employers cannot, by offering attractive terms, encourage individuals to increase their rate of savings—that is, reduce their rate of consumption—thereby releasing resources for the production of commodities to be consumed by workers and also incidently providing the monetary working capital required to finance additional wage payments.

Technological Relationships

In the basic model outlined above, wages were paid out of past produce. We implied in that discussion that investment takes the form solely of investment in real wage payments. In fact, however, when their analysis extended beyond the case of a primitive agricultural economy, the classics recognized clearly the existence of investment in fixed capital. Insofar as the accumulated capital stock existing at any time comprises both fixed capital and "wage goods", or "circulating capital", it is essential for the wages-fund theorist to explain what proportion of the stock represents the inventory of wage goods or circulating capital. Moreover, if over time the total capital stock is growing, will the division between the two broad categories vary? Only when these questions have been answered is it possible to discuss the demand for labour in terms of a "predetermined" wages fund—that is, a predetermined amount of circulating capital.

It is frequently claimed that the classical writers took the division of the capital stock between fixed and circulating capital to be a "technological matter".[22] Saving would accordingly increase both fixed and circulating capital in proportion. To say this means that we are satisfied that the division will not be affected by the dependent variable of the analysis whose value we seek to determine, namely the wage rate. For the wages-fund theory is designed to contribute to an explanation of the equilibrium wage rate; should variations in the wage rate itself influence the division of a given capital stock, then evidently the size of the wages fund would itself be altered and could no longer serve as an explanatory variable in the analysis of wages.

A changing wage rate will affect the proportion of any capital stock which constitutes circulating capital if the degree of mechanization of process is influenced thereby, for an increase in the real wage rate might encourage increased mechanization. Moreover, even if the degree of mechanization within any *single* industry cannot be altered, the problem will not be solved unless *all* industries operate with similar degrees of mechanization. Should this not happen, then rising wage rates will exert a greater influence upon production costs in the relatively labour-intensive sectors leading in effect to a relative contraction thereof; so that on balance, in the economy as a whole, the proportion of the aggregate capital stock devoted to wage payments would be reduced and that devoted to fixed capital correspondingly increased. In brief, the wages-fund theory implies the assumption of strict complementarity between factors of production.

By adopting the assumption of fixed factor proportions, the classical economists ruled out the possibility of increased intensity of utilization of one factor by applying increasing amounts of a second factor. At any time—in the absence of technical change—they envisaged a unique "best" method of operation which was independent of relative input prices; so that, for example, if wage rates rise in relation to other input prices, entrepreneurs cannot turn to methods which are less labour intensive. We shall return to this issue in the following section.

Productivity and Wages

A broad set of criticisms directed against the classical approach to wages can be summed up in the view that a satisfactory theory of the demand for labour in some way should relate the real wage to the labourer's contribution to production. We may illustrate this argument from the writings of a well-known nineteenth-century American critic:

> It is, then, for the sake of future production that the labourers are employed, not at all because the employer has possession of a fund which he must disburse, and it is the value of the product, such as it is likely to prove, which determines the amount of wages that can be paid, not at all the amount of wealth which the employer has in his possession or can command. Thus it is production, not capital, which furnishes the motive for employment and the measure of wages.[23]

> Whether wages are advanced out of capital in whole, or in part, or not at all, it still remains true that it is the product to which the employer looks to ascertain the amount which he can afford to pay; the value of the product furnishes the measure of wages. . . . When the employer shall pay is a financial question; what he shall pay is the true industrial question with which we have to do in treating wages. This is determined by the efficiency of labour under the conditions existing at the time and place.[24]

Walker's criticisms have the merit of focusing upon the *motive* behind the demand for labour services. Intuitively, a change in labour efficiency would be expected to lead to a change in the demand for labour and, given the conditions of labour supply, to a variation in the wage rate. However, it should be emphasized that the classical writers did not divorce the wages fund from all considerations of productivity. The size of the wages fund would tend to vary from period to period as the objective circumstances upon which capitalists base their decisions altered. The actual level of productivity would presumably be one of the variables considered by capitalists deciding upon the optimum rate of investment and consequently upon the size of the wages fund. An increase in labour productivity would probably encourage a higher rate of investment. It is true, however, that the relationship between increased productivity and increased labour incomes is indirect, operating via capitalists' prior decisions regarding investment and the size of the wages fund. In this regard the model is clumsy. However, a satisfactory solution was not possible until methods had been developed which permitted some degree of precision in the isolation of labour's contribution to production. But as we have seen in the previous section, the classical economists ruled out this possibility by their assumption of fixed proportions between productive factors, whereby variations in a *single* input have no effect on output.

A Demand Curve of Unitary Elasticity

It was pointed out at the outset of this section that if during any given period the aggregate wages bill is a "predetermined" amount, then a given percentage reduction in the wage rate must lead to precisely the same percentage increase in the demand for labour services. This is stated unambiguously in the following extract from the work of J. S. Mill:

> There is supposed to be at any given instant, a sum of wealth, which is unconditionally devoted to the payment of wages of labour. This sum is not regarded as unalterable, for it is augmented by saving, and increases with the progress of wealth; but it is reasoned upon as at any given moment a predetermined amount. More than that amount it is assumed that the wage-receiving class cannot possibly divide among them; that amount, and no less they cannot but obtain. . . .
>
> In this doctrine it is by implication affirmed, that the demand for labour not only increases with the cheapness, but increases in exact proportion to it, the same aggregate sum being paid for labour whatever its price may be.[25]

A satisfactory analysis of the demand for labour, as Walker pointed out, must be able to explain the motive behind the employers' increased requirements for labour services following a reduction in the wage rate. In modern analysis there is no problem, for it is assumed to be technically possible for the available fixed plant and equipment to be used more intensively if necessary, and a reduced wage rate makes more intensive utilization of fixed plant profitable. However, the classics denied this possibility. It is accordingly difficult to appreciate why employers should be induced to employ more labour following a reduction in the wage rate since, unless the fixed capital structure is increased, additional labour makes no additional contribution to output. In technical terms the marginal product of labour is zero and the demand for labour should accordingly be of zero elasticity rather than of unitary elasticity. We return to this issue in the following section, which deals with the problem of wage-rate determination in classical analysis.

CLASSICAL THEORY OF WAGE-RATE DETERMINATION AND EMPLOYMENT

Population Constant

According to the wages-fund theory, the demand for labour is of unitary elasticity. In the short run, with a given population, the labour supply is unresponsive to the wage rate, according to the classical writers. In the classical tradition full employment of the given labour force is assured as long as the real wage rate is flexible. Should there exist an excess supply of labour, the wage rate will be driven down by competition until equilibrium is attained—that is, until the entire work force has found employment. Conversely, particularly low wage rates at which the quantity demanded of labour services exceeds the quantity supplied will be short lived, and the wage rate will be forced up by competition.[26]

But as we have noted, the classical writers assumed fixed technical coefficients. If the production function and demand conditions make it profitable to employ one thousand men and if the labour market bids down the wage rate, then there is no obvious reason why entrepreneurs should employ more men at the lower rate. On the contrary, they may rather be expected to employ only the original work force at a lower rate. Therefore, it appears quite likely for a conflict to arise between the volume of employment required and the full-employment volume.

The Service Sector as Solution[27]

A possible reconciliation between the classical assumption of complementary input relations and the classical insistence that flexible real wage rates suffice to assure full employment may be based upon the distinction between industrial and service labour (or in classical terms, between "productive" and "unproductive" labour). Although service labour was often assumed away as a first approximation, it is frequently stated that the theory of wage-rate determination was intended to apply quite generally. Following once more J. S. Mill's usage, the supply of labour referred to those "who work for hire", and the demand for labour to that part of circulating capital "which is expended in the direct purchase of labour" together with "all funds which, without forming a part of capital, are paid in exchange for labour, such as the wages of soldiers, domestic servants, and all other unproductive labourers". Now the assumption of fixed factor proportions was applied only to the industrial sector. Service labour was not made to depend upon the support of complementary equipment and materials. It then follows that, at any given time, the level of employment in the industrial sector will be strictly determined by the actual available stock of fixed capital (plant and equipment) and materials; if, however, the total labour force exceeds this level, such excess labour will be absorbed into the service sector. In this manner full employment can be assured.

It follows that according to the above "solution" we must distinguish carefully, as far as the industrial sector is concerned, between a *theory of employment* and a *theory of wage-rate determination*: employment of industrial labour depends upon the available fixed capital and, unless it can be absorbed into a sector where fixed capital is not required, the wage rate will, in principle, sink to zero should an excess labour supply exist. Only in the case of such absorption will the market be cleared at a positive wage rate. But once we allow for the demand for service labour, such as soldiers and menial servants, there seems to be no logic for the notion that aggregate wage income should be considered as a "predetermined" amount.

A Bargaining Solution

Toward the close of the classical period some writers showed dissatisfaction with simple demand-supply equilibrium analysis. W. T. Thornton, for example, emphasized cases involving indeterminate prices created by the presence of discontinuities in either the demand or the supply functions, and—of particular significance for our purposes—by the possibility of completely inelastic and coincidental demand and supply functions.[28] In those instances where the functions coincide there is evidently no unique price at which the market is in equilibrium.

This general criticism, which in reality is merely the recognition of a special case, was brought to bear against the wages-fund theory and the classical analysis of wage-rate determination. The importance of Thornton's objections lies in the influence which they exerted upon J. S. Mill, who explicitly admitted that his earlier views on the labour market had been completely erroneous. The truth is, he argued in a "recantation", that the demand for labour services is in fact unresponsive to wage-rate changes: "Does the employer require more labour, or do fresh employers of labour make their appearance, merely because it can be bought cheaper? Assuredly, no."[29] Textual evidence suggests that both Thornton and Mill in fact presumed that the fixed capital structure of firms was given, in which case—on the assumption of strict input complementarity—there would indeed be no response to wage reductions.

The supply of labour for a given population was still presumed to be of zero elasticity. If the two vertical curves should coincide, there will evidently be no unique wage rate at which the market is cleared. The actual wage rate will depend in such a case upon the relative bargaining strengths of employers and employees.[30] Evidently, since the wage rate and hence aggregate wages depend upon the outcome of a bargaining process, any notion of a "predetermined" aggregate wages bill had to be abandoned.

It is clear, although the issue was not raised explicitly by either Thornton or Mill, that if the vertical supply curve should lie to the right of the vertical demand curve, then it is likely that the wage rate will be driven down toward zero; and, conversely, if the supply curve should lie to the left of the demand curve, there will be upward pressure on the wage rate. The competitive process might still operate in these instances. It is the case where the curves coincide, so that the competitive process is entirely inoperative, that was emphasized by Thornton and Mill. Furthermore, both economists neglected the presence of a service sector and therefore the possibility that the labour market might be cleared at a unique rate of wages by competition as in the "solution" suggested above. In essence their position reflected the fact that a sensible wages-fund theory applied to the industrial sector was impossible to justify in the presence of strict input complementarity.

The attack on the wages-fund theory was not directed principally against the notion that wages are advanced out of past produce to support labour during the current period. The main issue was whether or not it is possible to justify a response on the part of employers to wage-rate reductions. It was recognized that such a response could not be justified on the assumption of a given fixed capital complex and strict complementary input relations. Accordingly, bargaining had to be relied upon in certain circumstances. Unfortunately, no "theory" of bargaining was suggested. Apart from the generally held belief — going back to Adam Smith—that the advantages were likely to be largely on the side of employers, little was added to the development of the analysis of the labour market.

An important advance was forthcoming somewhat later, when, in 1881, F. Y. Edgeworth published his analysis of bilateral monopoly, which is still widely followed.[31] It was shown by mathematical treatment of the problem that we can ascertain mutually disadvantageous solutions to the wage rate which would be desired by neither party. The range of possible outcomes may then be narrowed down to positions from which movement would be opposed by either one or other of the parties. Nevertheless, Edgeworth concluded that the actual result remained indeterminate. It is only in very recent years that further progress has been made in the theory of bargaining.[32]

Population Variable

According to the "subsistence" theory of wages, there exists at any time a well-defined level of earnings from which in the long run the real wage rate cannot diverge. The long-run supply curve in this case will be infinitely elastic at that particular level. Thus changes in demand will lead only to changes in the level of employment and not to changes in the wage rate.

If, however, it is admitted that the wage minimum may vary over time as working-class expectations and habits change, then it must be recognized that the horizontal supply function will shift upward over time. In short, the real wage rate at which the labour market is in full long-run equilibrium will tend to rise over time. Thus an increase in the demand for labour will in the short run raise the wage rate, and population (and the work force) will respond. But how far, and therefore how far the wage rate will decline, will now depend upon the level of "subsistence" which happens to be relevant. Only when the minimum is constant through time will the real wage decline to its original level following a disturbance of this kind.

We have already shown that the leading classical economists, Ricardo and J. S. Mill, readily admitted that the subsistence minimum was likely to vary and yet continued to emphasize the Smithian-Malthusian doctrine whereby population (and accordingly the labour force) reacts to differentials between the actual wage rate and the "minimum" acceptable level. Their position is quite valid and is no different from the analysis of commodity markets, where it is allowed that over time the supply function may "shift" as a result of technical improvements.

If, however, the alteration in working-class habits and expectations is itself caused by variations in the real wage rate, then it is no longer possible to distinguish between a given horizontal long-run labour supply curve and shifts in the function over time. The long-run labour supply function will, in this case, tend to slope upward to the right. Now a change in labour demand will affect both employment and the wage rate.

AN "ALTERNATIVE" CLASSICAL THEORY OF WAGE-RATE DETERMINATION AND EMPLOYMENT

According to the theory of wage-rate determination with which we have so far been dealing, the "wages fund" constitutes the demand for labour. When considered in conjunction with the given labour supply, the wage rate is obtained as a competitive solution to a market equilibrating process. The data in this analysis are, therefore, the aggregate wages bill or the wages fund, constituting labour demand, and the given working population, constituting labour supply. The unknown which is to be derived is the wage rate. Running through the classical literature, however, there is to be found an "alternative" analysis of the labour market wherein aggregate wage income is not given beforehand but is the unknown to be determined. In brief, the demand curve for labour is not defined in terms of a predetermined wages bill. The alternative analysis was developed in explicit terms by the last of the classical writers of importance, J. E. Cairnes, in 1874, after Mill's recantation.[33] It is implied in certain of the arguments of other members of the school, including J. S. Mill himself.

Cairnes argued in the following terms. To assure the employment of any given industrial labour force a certain quantum of fixed capital must be provided, according to the classical assumption of fixed factor proportions. If the aggregate capital stock is known, then its division between fixed capital and wages-goods capital can be forecast accordingly as soon as the size of the working force is stated. Thus a rise in the work force requires an increase in the fixed capital complement, so that a smaller residual portion of the aggregate capital stock remains in the form of wages. It is apparent that the size of the wages bill is not, according to this version, given independently of the labour supply. On the contrary, the wages bill here appears as the competitive outcome in a model which takes as given aggregate capital and the technical coefficients of production, which together generate the demand curve for labour, and the working population, which as usual constitutes the labour supply. The argument is expressed in the following extract:

> Assuming a certain field of investment, and the prospect of profit in this field such as to attract a certain aggregate capital, and assuming the national industries to be of a certain kind, the proportion of this aggregate capital which shall be invested in wages is not a matter within the discretion of the capitalists, always supposing they desire to obtain the largest practical return upon their outlay. To accomplish this, the instruments of production—labour, fixed capital and raw material—must be brought together in certain proportions—the condition which requires . . . —the supply of labour being given—a distribution of the aggregate capital in certain proportions among those instruments. Supposing, now, capitalists to succeed in forcing down the rate of wages below the point at which, having regard to the number of the labouring population, the amount, which the fulfillment of this condition would assign to the payment of wages, was absorbed—either the capital thus withdrawn from the Wages-fund must remain uninvested and therefore unproductive, or if invested, and not invested in wages, it would take the form of fixed capital or raw material. But by hypothesis the fixed capital and raw material were already in due proportion to the labour force, and they would now consequently be in excess of it. A competition among capitalists for labour would consequently ensue; and what could this end in but a restoration to the Wages-fund of the amount withdrawn from it?[34]

According to the "simple" version of wage-rate determination, an increase in the work force of, for example, ten per cent would involve a decrease in the wage rate of the same percentage amount to assure that the wage bill in aggregate remained unchanged. But according to the present analysis, a ten per cent increase in the work force would require a reduction of the wage rate exceeding ten per cent, since the aggregate wage bill declines as the labour supply rises. In brief, the demand for labour in the "alternative" theory of the labour market is of less-than-unitary elasticity: "an increase or diminution in the supply of labour, where it is of a kind to be employed in conjunction with fixed capital and raw material, acts upon the rate of wages with a force *more than proportional* to the increase or diminution in the supply."[35]

It may perhaps be somewhat misleading to refer, as does Cairnes, to the theory under discussion as a wages-fund theory, since there exists no predetermined wages bill. Nevertheless, the wages bill is a determinate amount once the demand for labour and the supply are known. Knowledge of the basic determinants of demand and supply permits the observer to predict the wages bill which will be paid to labour. Although it is true of course that a certain labour income will after the event always have been earned during any period, it is not necessarily the case that the amount is predictable beforehand. Thus, we have seen earlier that according to the analysis of Thornton, which was accepted by J. S. Mill, the labour market may not be amenable to competitive analysis; in which case the solution will depend upon a process of bargaining and will be indeterminate. The significance of the present model lies in its attempt to construct a genuine demand curve for labour, in the presence of strict factor complementarity, which will permit the analysis of wages in terms of the competitive process. Several issues examined by the classical economists prior to Cairnes' publication imply the use of a model of this kind rather than the simple wages-fund theory.[36]

UNEMPLOYMENT IN THE CLASSICAL SYSTEM

The principal causes of unemployment were seen by the classics to be unrelated to the workings of the monetary mechanism. The emphasis was placed on various institutional impediments to resource mobility, including the effects of unions. This particular topic will be considered in full in a subsequent section. A second major cause of unemployment was examined within the context of "overpopulation". The existence of hard-core idleness would be ascribed to an excess population, or an excess supply of labour at the minimum "subsistence" wage. One possible cause for such a state of affairs which was considered by certain writers was the introduction of labour-saving techniques of production. The issue will be considered in this section.

We shall also show that the classical economists did not all deny the possibility that unemployment might be generated by a "breakdown" in the smooth operation of the monetary mechanism. Their point was that a corrective device existed which would assure that such an eventuality would be temporary only. In particular, the appearance of an inadequate aggregate demand for final product (an excess aggregate supply) was admitted as possible but was not considered to be more than a temporary phenomenon.

There is, however, one obstacle to the operation of the system which was categorically denied by the major nineteenth-century writers (with the exception of Malthus). This obstacle is the possibility that too much investment can occur relative to purchasing power, so that products fail to find a profitable market.

Say's Law: "Supply Creates its Own Demand"

Since the Keynesian "revolution" of the 1930's much emphasis has been placed on "monetary" causes of unemployment. Keynes examined the hypothesis that it might be impossible to maintain the full-employment level of national income, since there is no assurance that aggregate savings by the community out of its full-employment earnings will be translated into decisions to invest: in a system utilizing money, decisions to save do not lead directly to a demand for goods. In such cases any slack created in the consumption-goods sector is not fully taken up in the capital-goods sector and unemployment must result. At lower levels of activity, it was argued, the rate of savings will be reduced, so that an equilibrium level of national income and employment may be re-established when savings plans no longer exceed investment.

By contrast, the classical economists of our period, and in fact economists for the most part up until Keynes, did not emphasize this particular issue. In some instances it was categorically denied that it was possible to envisage circumstances in which savings are not invested; frequently the terms "saving" and "investment" were used interchangeably. On the other hand, it is certainly true that at times some writers of the classical school admitted the possibility of a deficiency of aggregate demand which imposes a constraint upon aggregate activity. However, such cases were regarded as temporary and it was taken for granted that the economic system contains its own corrective mechanism.[37] Unfortunately, the classics did not often examine the process of correction within the context of unemployment. Yet it is possible to reconstruct the implicit logic underlying the classical view that deficient aggregate demand cannot generate a permanent unemployment problem.

The classical argument would involve the assumption that commodity prices, money wages and the interest rate are fully flexible. We may envisage an initial full-employment state—that is, a situation where the labour market is cleared at some real wage rate and where the corresponding output is finding profitable markets. The community is satisfied with the stocks of money available and makes no attempt to add to its money balances from the proceeds of commodity sales. We may now assume an increase in the desire to hold money balances so that an excess demand for money at the original price and wage level appears. Correspondingly, there is created an excess supply of commodities (and of labour). But if the level of prices and money wages is free to fall, there will be no long-term problem. For while the excess demand for money exists, prices and wages will decline until in fact the community is satisfied with the available money balances and makes no attempt to add to them.[38]

In the "corrected" state the money market, the commodity market and the labour market are again in equilibrium. It should be noted in particular that equilibrium in the labour market is re-established at the original real wage rate, since no changes have occurred throughout in the "real" determinants of either the demand for or the supply of labour.

The excess demand for money, which we envisaged in the above example, may be interpreted in Keynesian terms as an attempt by the community to save out of full-employment income at a rate in excess of investment. Downward price and money-wage flexibility correct this tendency. In equilibrium there is no attempt to increase money balances so that savers devote their funds entirely to the purchase of bonds, or in other words lend their saved income to businesses. The demand for loanable funds was usually taken to be that of entrepreneurs seeking to invest in plant and equipment and other capital goods. And a freely flexible interest rate will assure that the supply of loanable funds (savings) at full-employment income will equal the demand for loanable funds (investment).

The proposition that monetary causes of unemployment are not to be taken seriously was sometimes stated as "supply creates its own demand". This reflects the assumption that at any level of income, including full employment, the money value of all goods supplied will equal the money value of goods demanded and there will be no attempt to add to money balances from the proceeds of sales. But this proposition does not necessarily imply that states of excess commodity supply (excess money demand) are *impossible*. Rather, it may apply to equilibrium states only.[39]

Impossibility of Overinvestment

We have referred to J. S. Mill's admission that an excess supply of commodities due to a temporary excess demand for money must be recognized. This proposition, however, was strictly separated from the argument put forward by Malthus and others that it was possible for investment to be carried on at an excessive rate.[40] Thus Mill, while admitting the temporary possibility of hoarding, denied the possibility of overinvestment:

> It is, however, of the utmost importance to observe that excess of all commodities, in the only sense in which it is possible, means only a temporary fall in their value compared to money. . . .
>
> The argument against the possibility of general overproduction is quite conclusive, so far as it applies to the doctrine that a country may accumulate capital too fast; that produce in general may, by increasing faster than the demand for it, reduce all producers to distress. . . . The essentials of the doctrine are preserved when it is allowed that there cannot be permanent excess of production, or of accumulation; though it be at the same time admitted, that as there may be a temporary excess of any one article considered separately, so may there of commodities generally, not in consequence of over-production, but of a want of commercial confidence.[41]

When investment occurs, it was argued, purchasing power remains intact. When capitalists "turn their income into capital, they do not thereby annihilate their power of consumption; they do but transfer it from themselves to the labourers to whom they give employment".[42] In the eventuality that population is increasing there is no problem since "the production of necessaries for the new population, takes the place of the production of luxuries for a portion of the old, and supplies exactly the amount of employment which has been lost". There is thus a reduction in the output of luxury goods consumed by capitalists and an increase in the production of "necessaries" consumed by the larger work force. But even if population is presumed to be *constant*, there will be no problem. The attempt by capitalists to expand the aggregate capital stock will be thwarted by the lack of a sufficient labour supply, and competition for the given labour force will cause the wage rate to rise until the additional investment outlays simply take the form of increased labour income. The income distribution will turn in favour of labour but at no point will there occur a deficiency of purchasing power:

> But suppose that there is no increase of population. The whole of what was previously expended in luxuries, by capitalists and landlords, is distributed among the existing labourers, in the form of additional wages. We will assume them to be already sufficiently supplied with necessaries. What follows? That the labourers become consumers of luxuries; and the capital previously employed in the production of luxuries, is still able to employ itself in the same manner: the difference being, that the luxuries are shared among the community generally, instead of being confined to a few.[43]

An increased investment program, financed by a reduction in consumption by capitalists, will thus result in an alteration in the income distribution in favour of wages in the case that the working force is constant, but at no stage will there occur a deficiency of purchasing power.[44]

Technological Displacement of Labour

We have argued above that in cases where unemployment is created by monetary causes, such as an attempt to add to money balances out of sales proceeds, the corrective mechanism envisaged involves downward flexibility of prices and money wages, but that equilibrium in the labour market will be reattained at the original real wage rate. It should now be made clear that any changes which by contrast occur in the "real" determinants of the demand for or the supply of labour will lead to an alteration of the real wage rate if equilibrium is to be re-established.

As we have seen earlier in the chapter, an increase in the supply of labour will require a reduction in the real wage rate. However, it is possible that the real wage rate is rigid downward. In particular, the original equilibrium rate may have been at the "subsistence" level. If, following the increase in labour supply, workers are willing in the short run to accept wages below "subsistence" then unemployment will indeed be avoided. But the observer would be able to predict that such a state of affairs could be temporary only; the subsistence level of earnings is the relevant long-run wage rate, and full long-run equilibrium requires a reduction in population. If, on the other hand, workers are even in the short run unwilling to accept below subsistence wages, then unemployment will be created immediately. The ultimate correction again requires a reduced population and work force.

A state of "overpopulation"—the existence of an excess labour supply at the subsistence wage rate—need not necessarily be created by an initial increase in the supply of labour. The same result can follow from an initial decrease in the demand for labour. We turn now to consider the classical recognition that technological change may create a state of overpopulation by reducing the aggregate demand for labour.

The problem of technological unemployment arises when it becomes possible, following the introduction of new techniques, to produce the current volume of national product with a smaller labour force than was hitherto necessary. What assurance is there that displaced labour will be reabsorbed into the labour force, and if it is reabsorbed will a reduction in the real wage rate be a necessary prerequisite?

No attention was paid to the issue of technological unemployment by Adam Smith. In common with later classical economists Smith believed that, given the state of technology, the factors of production had to be combined in constant proportions in the production of each commodity. If new-type techniques are introduced, then the capital-labour ratio might vary. But according to Smith the profitability of capital-intensive techniques lies in their output-expanding effects rather than in any labour-displacing effects. New technology is introduced only in response to a prior increase in demand; entrepreneurs seek to develop and apply methods which will permit a general expansion of output to meet the larger market without the necessity of expanding the labour force and increasing total labour costs. Such methods would have been irrelevant and indeed unprofitable at the original level of output. Accordingly, the problem of displacement of labour due to technological change was not recognized in the *Wealth of Nations*.[45]

Later classical writers were aware of the problem, however. Two principal approaches may be distinguished.[46] One argument originating with J. B. Say, and developed by McCulloch, reduces to an attempt to demonstrate that displaced labour must be reabsorbed by the economic system in expanding the national product. A technical change reducing labour requirements at some original level of output may be assumed to occur in a particular industry. Assuming further that free competition is the rule, it may be expected that the resultant fall in costs will permit larger sales at a reduced price. It was argued specifically that the "wealth of the buyers of cottons would not be impaired by their production being facilitated and their price reduced".[47] If the demand for the product involved is of unitary elasticity, then the same total amount will be spent by consumers on the product as was the case prior to the improvement. If on the other hand demand is inelastic, then less will be spent; but a larger sum will be available for expenditure on other products and this "windfall" will in fact be spent: "The revenue set free by the fall in cottons would not be permitted to lie idle in our pockets. It would be applied to purchase, either directly by the parties themselves, or indirectly by those to whom they might lend it, an additional quantity of something else. The total effective demand for labour, or the product of labour, would not therefore be in the least degree impaired."[48]

If on the other hand the industry involved is not operating under competitive conditions, then prices will not fall in proportion to costs; and entrepreneurs (or, in a monopoly, the entrepreneur) will enjoy increased net revenue. But it was presumed that these surpluses, too, would be spent rather than allowed to remain idle.

McCulloch referred also to the re-employment of displaced labour upon the construction of new machinery. Yet clearly the latter consideration could never be adequate alone since the advantage of the technical change lies in the reduction in labour costs after all stages of fabrication—including the production of the necessary equipment—have been taken into account.

It was readily admitted of course that temporary unemployment might be created and that during the period of readjustment the real wage rate might fall. In final long-run equilibrium, however, the entire labour force would be reabsorbed into the economic system at the original real wage rate due to the expansion of activity in one or more industries. There was accordingly no sound reason for the labouring class to object to technical improvement.

It will be noted that the entire argument of Say and McCulloch is based upon the proposition that the maintenance of the original level of aggregate expenditure upon final product is adequate assurance that the initial level of employment can be ultimately maintained with no reduction in working-class earnings. In brief, the argument is based upon Say's Law which was explained in the previous subsection. The Ricardian branch of the classical school objected that Say's Law cannot be used in the analysis of such issues. Changes in technology alter the "real" determinants of the demand for labour, and there is no guarantee that full employment can be maintained at the original wage rate. The significance of Say's Law lies in its assurance that deficient aggregate demand due to a desire to add to money balances need not be considered as a serious problem. On the other hand, the maintenance of aggregate demand by itself cannot assure full employment at a constant real wage should the demand for labour be reduced as a result of technical change.

Both Ricardo and J. S. Mill argued that a technical change which raises the fixed capital complement required to support each worker will entail a reduction in the quantity of labour services demanded at any wage rate, since a larger fraction of any given aggregate capital outlay must be devoted to fixed capital and consequently a smaller fraction remains in the form of wage payments. In brief, the labour demand curve declines.[49] If workers were originally at the subsistence level of real earnings, then either full employment can be maintained in the short run but only at below subsistence wage rates, or if the subsistence minimum is effective even in the short run, unemployment will immediately result. In either case an excess labour supply has been created by the technical change at the subsistence level, so that full long-run equilibrium requires a reduction of population and the work force. But even if the original real wage rate had exceeded subsistence allowing "leeway" for reduced real wages, it is clear that the working class will suffer a reduction in aggregate real wages.

Ricardo's intention was to deny the argument that the maintenance of aggregate demand assures the re-employment of the entire labour force at the original rate of wages. In principle the possibility that technical change might create unemployment or at least reduced wage incomes had to be recognized: "The opinion entertained by the labouring class, that the employment of machinery is frequently detrimental to their interests, is not founded on prejudice and error, but is conformable to the correct principles of political economy."[50] Yet in fact Ricardo was not pessimistic. His case had taken it for granted that aggregate capital was throughout constant and that its composition had been altered in favour of fixed capital and to the detriment of wages. If, however, the new techniques raise efficiency sufficiently to assure that gross produce does not decline or does not decline to any serious extent, then entrepreneurs may enjoy substantial increases in their net revenue which would provide the where-withall to undertake increased investment. Moreover, any downward pressure on the price level due to reduced costs would raise the purchasing power of capitalists' earnings and similarly encourage increased investment activity. Ricardo also referred to the probability that the increased real value of capitalists' net revenue resulting from either of the above tendencies might stimulate increased demand for menial servants. Thus Ricardo believed that in practice, in the long run, the demand for labour will again increase and assure full employment of the labour force at a wage rate which is not below subsistence.

Ricardo pointed to a further reason for optimism regarding the effect on employment of new technology. The new labour-saving machinery considered hitherto was assumed to have been introduced suddenly and to require a redistribution of the society's capital stock. If, however, technical change occurs gradually, then it was admitted that it would be financed from retained earnings generated by current activity so that there would be no need to make diversions of the existing capital stock: "The truth is, that these discoveries are gradual, and rather operate in determining the employment of the capital which is saved and accumulated, than in diverting capital from its actual employment."[51]

We have seen that according to the Ricardian analysis technical change creates the possibility that some unemployment will result and that labour incomes might decline. Reabsorption of displaced labour and the prevention of a decline in aggregate wages requires increased investment, or "capital widening" financed from increased real profits. The classics were confident in the ability of the economic system to generate a sufficiently rapid increase in capital to raise the demand for labour, so that —in the long run—gross national product, aggregate capital and employment might be higher than in the absence of technical change. Yet the admission that technological unemployment was possible and that workers might suffer reduced real incomes as a consequence of new technology laid the groundwork for misgivings later to be expressed by Marx.

It is of some interest that a Parliamentary Committee reporting in 1827 on the issue of emigration from the United Kingdom ascribed contemporary unemployment, in part at least, to technical improvements and took the view that the reabsorption of labour displaced in one industry required a high level of activity *elsewhere* in the economy.

> In addition to those ordinary causes, which in many parts of the United Kingdom appear to have led to a superabundant Population, or rather to a disproportion between the demand and supply of labour, an important change has been wrought, and is still in gradual but certain progress, in the condition of some of the manufacturing districts, by the transition from Hand-loom to Power-loom weaving. For some time the advance in the cotton trade was so rapid as nearly, if not altogether to absorb in the more productive system, the hands thus thrown out of employment. But difficulties arising from a temporary check in trade, shortly fell upon the weavers with the double pressure of these two combined causes, a diminished demand for the produce of their industry, and an increased facility of production . . . . Independently of the extent of the change, the time at which it has taken place, with reference to their peculiar branch of trade, is for the Weavers most unfortunate;—and most, if not all, the ordinary channels of labour are in such

a state of repletion, that it is difficult for them to transfer their industry elsewhere.[52]

THE WAGE STRUCTURE AND THE ROLE OF GOVERNMENT IN EDUCATION[53]

We do not intend to discuss the issues relating to manpower policy exhaustively in this chapter. Of course, the classical writers did not recommend that government accept responsibility for forecasting future manpower needs and for taking the necessary steps to assure that such needs are satisfied. Nevertheless, they were concerned with the question of whether the market process could be relied upon to assure the "correct" supplies of labour of particular skills, and the resolution of this issue is a necessary preliminary to the broader issues of manpower planning. But it should be noted that our concern here is not specifically with the form which government intervention might take should it be called for. The question with which we are concerned is simply whether a problem was at all recognized by the classics, or whether they were quite confident in the operation of the free market. In this section we shall consider the Smithian analysis of the wage structure, the absence in the classical literature of a case in favour of government support for vocational training and the relationship envisaged between elementary education and labour mobility.

The Smithian Analysis of the Wage Structure

In the first place, it is necessary to consider the argument that in the absence of government intervention a misallocation of resources is likely to exist. Such misallocation might derive from numerous sources, but of particular significance are the financial and other obstacles which prevent an adequate supply of labour of specific skills from entering the most profitable occupations. As a consequence, earnings which exceed the competitive rates are likely to persist in certain occupations and, conversely, earnings which fall below the competitive rates are likely in others.

Smith recognized certain institutional impediments which in the Britain of his day tended to hinder the transfer of labour from one occupation to another.[54] Apart from these artificial constraints he was confident in the market process. He envisaged a mechanism which assured that earnings in different occupations would tend to keep in line, so that different monetary returns in long-run equilibrium merely reflected the varying degrees of attractiveness attached to each occupation. Thus, free competition would not assure an equality of monetary returns but would assure that monetary and non-monetary returns together were equalized between occupations. Smith distinguished five main characteristics which, as he put it, "make up for a small pecuniary gain in some employments, and counterbalance a great one in others":

> . . . first, the agreeableness or disagreeableness of the employments themselves; secondly, the easiness and cheapness, or the difficulty and expense of learning them; thirdly, the constancy or inconstancy of employment in them; fourthly, the small or great trust which must be reposed in those who exercise them; and fifthly, the probability or improbability of success in them.[55]

An implicit assumption throughout is evidently that labour can transfer from one occupation to another to assure that in the long run relatively high money earnings in fact exactly counterbalance non-monetary disadvantages. Smith took this prerequisite for granted and, as we have noted, admitted the existence of certain institutional hindrances. He further insisted that the logic of the argument only applied when the different occupations were "well known and long established" for equalization of net advantages cannot be expected if knowledge of available opportunities is limited, and when the occupations are "the sole or principal employments of those who occupy them", since workers operating on a part-time basis are likely to accept particularly low monetary returns.[56]

It may be worthwhile to indicate the extent to which Smith, and other classical writers, tended to play down the restraints imposed on mobility due to the difficulties involved in attaining the necessary skills. For example, in a discussion of the consequences of the abolition of trade barriers, Smith denied that long-term unemployment would result:

> Though a great number of people should, by thus restoring the freedom of trade, be thrown all at once out of their ordinary employment and common method of subsistence, it would by no means follow that they would thereby be deprived either of employment or subsistence. . . . To the greater part of manufactures . . . there are other collateral

> manufactures of so similar a nature, that a worker can easily transfer his industry from one of them to another.[57]

It was in fact precisely on the grounds that workers may easily transfer from one trade to another that Smith condemned contemporary practices relating to apprenticeship:

> Long apprenticeships are altogether unnecessary. The arts, which are much superior to common trades, such as those of making clocks and watches, contain no such mystery as to require a long course of instruction. . . . How to apply the instruments and how to construct the machines, cannot well require more than the lessons of a few weeks, perhaps those of a few days might be sufficient. In the common mechanical trades, those of a few days might certainly be sufficient.[58]

Similarly, McCulloch repeated the theme that the acquisition of new skills poses no serious problem, and applied it both to the issue of free trade and to that of the technological displacement of labour: "most industrial undertakings have so many things in common, that individuals familiar with one have seldom much difficulty in accommodating themselves to others."[59]

Although Smith emphasized the ease with which skills may be acquired by the working class, he was, nevertheless, acutely aware of the fact that workers could not afford a costly education: "the common people . . . have little time to spare for education. Their parents can scarce afford to maintain them even in infancy. As soon as they are able to work, they must apply to some trade by which they can earn their subsistence."[60] Evidently, Smith did not fear that the exclusion of workers from occupations requiring a heavy preliminary "investment" in education in any way thwarted the process of net equalization of returns. He apparently presumed that a sufficient number of relatively wealthy individuals were available to assure that, in the long run, excessive returns in such occupations would be eliminated.

The Smithian analysis was, however, severely criticized by J. S. Mill on the grounds that inadequate attention had been paid to impediments to mobility, particularly the financial and other obstacles which prevent the attainment of requisite skills by sufficiently large numbers to assure that monopoly returns are eradicated. It is true that according to Smith monetary returns must suffice to indemnify costs of training. But he did not consider the possibility that long-run returns might persist which exceed the amount required to compensate educational costs, apart from instances of excessive returns due to institutional constraints upon entry into skilled trades. In Mill's view it is necessary to recognize returns in skilled occupations which permanently exceed the competitive rate, and which result from immobility due to financial obstacles which prevent the acquisition of the necessary training:

> But, independently of these or any other artificial monopolies, there is a natural monopoly in favour of skilled labourers against the unskilled, which makes the difference of reward exceed, sometimes in manifold proportion, what is sufficient merely to equalize their advantages. If unskilled labourers had it in their power to compete with skilled, by merely taking the trouble of learning the trade, the difference of wages might not exceed what would compensate for that trouble, at the ordinary rate at which labour is remunerated. But the fact that a course of instruction is required, of even a low degree of costliness, or that the labourers must be maintained for a considerable time from other sources, suffices everywhere to exclude the great body of the labouring people from the possibility of any such competition.[61]

Mill went further, however, and argued that social impediments to mobility had tended to create a degree of immobility between occupations which effectively prevented the process of net equalization. Competition might be effective within groups but not between groups of labourers:

> So complete, indeed, has hitherto been the separation, so strongly marked the line of demarcation, between the different grades of labourers, as to be almost equivalent to an hereditary distinction of caste; each employment being chiefly recruited from the children of those already employed in it, or in employments of the same rank with it in social estimation, or from the children of persons who, if originally of a lower rank, have succeeded in raising themselves by their exertions.[62]

Thus Mill, unlike Smith, regarded the financial (and social) obstacles to working-class mobility as a serious cause of resource misallocation.

Mill voiced other objections to the Smithian analysis. According to Smith's argument it was to be expected that the least pleasant occupations would, *ceteris paribus*, be the highest paid.

It was pointed out by J. S. Mill that at best—that is, apart from the existence of impediments to mobility which thwart the process of net equalization—the result envisaged presumes that the aggregate labour market is in equilibrium (or that there exists an excess demand for labour). Should unemployment exist in the labour force as a whole, it is probable that the least agreeable occupations are also the worst paid. Mill implies that the excess labour supply is likely to be relatively greatest in the disagreeable and unskilled trades. His argument is of great significance and worth reproducing:

> These inequalities of remuneration, which are supposed to compensate for the disagreeable circumstances of particular employments, would, under certain conditions, be natural consequences of perfectly free competition: and as between employments of about the same grade, and filled by nearly the same description of people, they are, no doubt, for the most part, realized in practise. But it is altogether a false view of the state of facts, to present this as the relation which generally exists between agreeable and disagreeable employments. The really exhausting and the really repulsive labours, instead of being better paid than others, are almost invariably paid the worst of all, because performed by those who have no choice. It would be otherwise in a favourable state of the general labour market. If the labourers in the aggregate, instead of exceeding, fell short of the amount of employment, work which was generally disliked would not be undertaken, except for more than ordinary wages. *But when the supply of labour so far exceeds the demand that to find employment at all is an uncertainty*, and to be offered it on any terms a favour, *the case is totally the reverse*. Desirable labourers, those whom every one is anxious to have, can still exercise a choice. The undesirable must take what they can get. The more revolting the occupation, the more certain it is to receive the minimum of remuneration, because it devolves on the most helpless and degraded, on those who from squalid poverty, or from want of skill and education, are rejected from all other employments. *Partly from this cause, and partly from the natural and artificial monopolies* which will be spoken of presently, *the inequalities of wages are generally in an opposite direction to the equitable principle of compensation erroneously represented by Adam Smith* as the general law of the remuneration of labour. The hardships and the earnings, instead of being directly proportional, as in any just arrangement of society they would be, are generally in an inverse ratio to one another.[63]

It is striking to find in the work of a leading classical economist an objection to the Smithian principles of relative wage-rate determination based upon the presumption that the labour market as a whole is not in equilibrium.

Role of Government in Vocational Education

We shall consider here the argument against state intervention in vocational training based on the view that an "inadequate" wage differential between skilled and unskilled occupations might be created. The case for state intervention on grounds of a divergence between social and private returns to investment in education, and that based on the proposition that consumer knowledge in the purchase of educational services is imperfect, were usually applied—as we shall show—to elementary rather than to vocational training.

Inadequate Wage Differentials

We have seen that Adam Smith believed that, in the absence of artificial restrictions, all monopoly returns would be competed away. It is not, therefore, surprising that he condemned government aid to vocational training on the grounds that the result would be to drive the returns in skilled trades below the competitive level:

> It has been considered as of so much importance that a proper number of young people should be educated for certain professions, that, sometimes the public, and sometimes the piety of private founders have established many pensions, scholarships, exhibitions, bursaries, &c. for this purpose, which draw more people into those trades than could otherwise pretend to follow them. . . . The long, tedious, and expensive education, therefore, of those who are [educated altogether at their own expense], will not always provide them a suitable reward . . . and in this manner the competition of the poor takes away the reward of the rich.[64]
>
> It might then not be worth any man's while to educate his son to . . . those professions at his own expense. They would be entirely abandoned to such as had been educated by those public charities, whose numbers and necessities would oblige them in general to content themselves with a very miserable recompense.[65]

Yet even J. S. Mill (who recognized, as we have seen, that the inability of the working class to afford education generated monopoly returns in skilled trades) adopted Smith's argument that government intervention was undesirable because of the danger that inadequate wage differentials would result. Mill's hesitancy to justify government aid to vocational education is particularly surprising since he summarized the case for such intervention clearly. Historically, he argued, monopoly returns in skilled trades had been reduced by government aid:

> While it is true, as a general rule, that the earnings of skilled labour, and especially of any labour which requires school education, are at a monopoly rate, from the impossibility of the mass of the people, of obtaining that education; it is also true that the policy of nations, or the bounty of individuals, formerly did much to counteract the effect of this limitation of competition, by offering eleemosynary instruction to a much larger class of persons than could have obtained the same advantages by paying their price.[66]

One reason for Mill's attitude appears to be that in his view great social changes were underway in Britain which were breaking down traditional impediments to mobility and also were bringing within reach of ever growing numbers of the working class basic elementary knowledge.[67] In these circumstances government support of vocational training might not only eliminate monopoly returns but, as Smith believed, go too far and generate below competitive earnings.

A second explanation for Mill's attitude relates to the classical theory of wage-rate determination in the labour market as a whole—that is, to the determination of the average wage rate. This, as we have seen earlier in the chapter, depended on the one hand upon the capital stock, which determines the demand for labour, and on the other upon the working population. The Malthusian reaction to differentials between actual earnings and "subsistence" earnings was still uppermost in Mill's mind. He feared that too rapid a dissolution of the impediments to upward mobility would simply lead to increased population and a lower average return. This argument is stated clearly in the following extract:

> The general relaxation of conventional barriers, and the increased facilities of education which already are, and will be in a much greater degree, brought within the reach of all, tend to produce, among many excellent effects, one which is the reverse; they tend to bring down the wages of

> skilled labour. The inequality of remuneration between the skilled and the unskilled is, without doubt, very much greater than is justifiable; but it is desirable that this should be corrected by raising the unskilled, not by lowering the skilled. If, however, the other changes taking place in society are not accompanied by a strengthening of the checks to population on the part of labourers generally, there will be a tendency to bring the lower grades of skilled labourers under the influence of a rate of increase regulated by a lower standard of living than their own, and thus to deteriorate their condition without raising that of the general mass; the stimulus given to the multiplication of the lowest class being sufficient to fill up without difficulty the additional space gained by them from those immediately above.[68]

Mill was, therefore, apparently willing to tolerate the excessive wage differentials between skilled and unskilled occupations at least until the population issue had been resolved. We shall see presently that precisely the same argument was used to justify the restrictive practices of unions in skilled trades.

Divergence of Social and Private Returns

Inefficient resource allocation may arise from a divergence between the social return and the private return to investment. This is true also in the case of "investment in education". As far as elementary education is concerned the classics did base a case for government intervention upon the argument that the social return exceeded the private return, so that the market could not be relied upon to generate sufficient outlays upon education and an adequate supply of literate workers. Much emphasis was placed upon the socially nefarious consequences which result from an illiterate population, particularly one which is preoccupied with highly specialized tasks which it was argued are undertaken at the expense of the worker's "intellectual, social and martial values":[69]

> But though the common people cannot, in any civilized society, be so well instructed as people of some rank and fortune, the most essential parts of education, however, to read, write, and account can be acquired at so early a period of life, that the greater part even of those who are to be bred to the lowest occupations, have time to acquire them before they can be employed in those occupations. For a very small expense, the public can facilitate and encourage, and can even impose upon almost the whole

> body of the people, the necessity of acquiring those most essential parts of education.[70]

Similarly, Mill referred to the argument that society as a whole is "liable to suffer seriously from the consequences of ignorance and want of education" so that, because "elementary instruction cannot be paid for, at its full cost, from the common wages of unskilled labour, and would not if it could", government support was called for.[71] J. S. Mill included "economic" advantages in the social benefits of elementary education:

> A thing not yet so well understood and recognised, is the economical value of the general diffusion of intelligence among the people. The number of persons fitted to direct and superintend any industrial enterprise, or even to execute any process which cannot be reduced almost to an affair of memory and routine, is always far short of the demand; as is evident from the enormous difference between the salaries paid to such persons, and the wages of ordinary labour. The deficiency of practical good sense, which renders the majority of the labouring class such bad calculators . . . must disqualify them for any but a low grade of intelligent labour, and render their industry far less productive than with equal energy it otherwise might be. The importance, even in this limited aspect, of popular education, is well worthy of the attention of politicians . . . .[72]

The argument in support of government aid to elementary education on the grounds of a high social return was stated particularly clearly by Senior. It is interesting that the benefits which were emphasized were largely "economic":

> Another of the evils of poverty which a government can palliate is defective education. Here again it can only palliate. A really good education implies leisure. . . . But this is incompatible with the condition of the labouring classes. That is to say, with the condition of the bulk of a people. They cannot afford to lose all the wages which their children and young persons can earn. . . .
>
> Leisure, however, sufficient for the acquisition of much elementary knowledge they have . . . . The factory act, which limits the labour of children under 13 years of age to 6 hours a day and requires two hours to be spent in school, is so far a useful act. But it is obvious that a further, or rather a previous step is to secure the existence of good schools. And this is in the power of every civilised government.
>
> No country is so poor as to be unable to bear the expense of good elementary schools. Strictly speaking it is not an

> expense. The money so employed is much more than repaid by the superiority in diligence, in skill, in economy, in health—in short in all the qualities which fit men to produce and to preserve wealth, of an educated over an uneducated community.[73]

As far as *vocational* training is concerned, it is clear that Smith considered that private and social returns coincide so that the market can be relied upon to generate adequate investment. Consider, for example, Smith's references to an earlier discussion by David Hume to this effect:

> Most of the arts and professions in a state, says by far the most illustrious philosopher and historian of the present age, are of such a nature, that while they promote the interests of the society, they are also useful and agreeable to some individuals; and in that case, the constant rule of the magistrate, except, perhaps, on the first introduction of any art, is, to leave the profession to itself, and trust its encouragement to the individuals who reap the benefit of it. The artizans, finding their profits to rise by the favour of their customers, increase, as much as possible, their skill and industry; and as matters are not disturbed by any injudicious tampering, the commodity is always sure to be at all times, nearly proportional to the demand.[74]

A clearer statement to the effect that normally social and private returns may be presumed to coincide cannot be imagined. Yet the allowance that government aid might be called for "on the first introduction of any art" should be noted carefully, for it is possible that Hume and Smith would have adopted a different attitude in an economy undergoing rapid changes in products and processes.

Some reference may be made at this juncture to Smith's recommendation that a modernized curriculum was desirable. Elementary education should be extended to "geometry and mechanics":

> If in those little schools . . . they were instructed in the elementary parts of geometry and mechanics, the literary education of this rank of people would perhaps be as complete as it can be. There is scarce a common trade which does not afford some opportunities of applying to it the principles of geometry and mechanics, and which would not therefore gradually exercise and improve the common people in those principles, the necessary introduction to the most sublime as well as the most useful sciences.[75]

To some extent it may appear that vocational training is implied in the above recommendation and indeed that for the first time Smith was recognizing the impediments to mobility created by limited educational opportunities. But on balance it would appear that the emphasis is upon elementary education rather than on training in specific skills, although it is true that a more ambitious program than had been practised was desirable in order to raise the productivity of the working force.

A case for government support of basic research on the grounds of a divergence between social and private returns may be found in the work of J. S. Mill, but the argument is not applied generally to vocational education:

> The cultivation of speculative knowledge, though one of the most useful of all employments, is a service rendered to a community collectively, not individually, and one consequently for which it is, *prima facie*, reasonable that the community collectively should pay: since it gives no claim on any individual for a pecuniary remuneration; and unless a provision is made for such services from some public fund, there is not only no encouragement to them, but there is as much discouragement as it implied in the impossibility of gaining a living by such pursuits. . . . It is highly desirable, therefore, that there should be a mode of insuring to the public the services of scientific discoverers, and perhaps of some other classes of savants, by affording them the means of support consistently with devoting a sufficient portion of time to their peculiar pursuits.[76]

Deficient Consumer Knowledge

A possible argument for state intervention might arise where consumer knowledge is limited because of the nature of the product in question. Such a case was developed by Mill to support a claim for government support of education:

> [The consumer] is generally the best judge . . . of the material objects produced for his use. . . . But there are other things, of the worth of which the demand of the market is by no means a test; things of which the utility does not consist in ministering to inclinations, nor in serving the daily uses of life, and the want of which is least felt where the need is greatest. This is particularly true of those things which are chiefly useful as tending to raise the character of human beings. The uncultivated cannot be the competent judges of cultivation. . . . It will continually happen, on the voluntary system, that the end not being desired, the means

> will not be provided at all, or that, the persons requiring improvement having an imperfect or altogether erroneous conception of what they want, the supply called forth by the demand of the market will be anything but what is really required. . . . Education, therefore, is one of those things which it is admissible in principle that a government should provide for the people.[77]

It is not easy to judge the range of cases to which Mill intended such an argument to apply. In principle, it might be used to justify considerable state intervention in all branches of education including the acquisition of vocational skills. Yet the references to "things which are chiefly useful as tending to raise the character of human beings" and the view that "the uncultivated cannot be the competent judge of cultivation" would suggest that the argument was intended to apply to general education only rather than to vocational training.

Elementary Education and Labour Mobility

We have seen that immobility of labour was attributed by the classical economists largely to artificial constraints, including those due to unionization, rather than to the financial and other obstacles which hinder a worker from acquiring skills. Even in the case of J. S. Mill, who attributed to such obstacles a maldistribution of resources, there was no call for government intervention in vocational training.

Yet the classical position relating to elementary education, which envisaged a role for government intervention, is to some extent relevant to the issue of labour mobility. In the first place, to the extent that many workers were initially receiving no education at all, the introduction of basic elementary studies would understandably tend to increase mobility. Indeed, starting from an illiterate base, elementary and vocational training are difficult to distinguish since the former is a necessary prerequisite for the latter. There is no doubt that Mill attributed to extended elementary education increased mobility in the lower ranks of skilled labour.[78] Mill's optimism in this regard may partly explain his hesitancy to recommend government intervention directly in vocational training.

In addition to the direct effects on mobility of extended elementary education, a case was sometimes made for state support of an educational program which would encourage workers to avoid overcrowded occupations and to exercise self-denial by putting their children into trades other than their own, despite the immediate returns which may thereby be sacrificed. Thus, as a result of good state-supported elementary education, "the exercise of the activity, intelligence, self-denial, and prudence to which we have alluded, might so proportion their number to their employments as to secure good average wages".[79] According to this recommendation, mobility would be enhanced indirectly by encouraging workers to avoid declining industries.

Summary

The absence in the classical literature of an explicit case for government support of vocational training should not be interpreted as a reflection of hostility in principle to such intervention. It is likely that in certain circumstances the classics would have altered their prescriptions. For example, we have noted the admission, albeit casual, by Hume and Smith that in the case of *new* trades the coincidence of private and social returns is likely to be disturbed and accordingly government intervention justified. If the Malthusian population reaction had no longer represented in J. S. Mill's opinion a serious consideration, he would probably have recommended some degree of state intervention to overcome labour immobility created by workers' inability to finance vocational training costs. Moreover, Mill's recognition of a divergence between private and social returns in the case of basic scientific research might in principle be extended to a wide variety of other cases should circumstances require it.

It is particularly significant that the classical argument for government aid to elementary education was based partly upon the view that increased vertical mobility would result therefrom. Today, it is more common to envisage such a consequence to follow from vocational training, since a literate population is taken for granted.

CLASSICAL ATTITUDE TO TRADE UNIONS

In this section we consider further the attitude of the classical economists to particular policy issues. It is frequently implied in the literature that the classics were hostile to unionization by the labour force, and furthermore that they considered unions to be incapable of raising workers' living standards. We turn now to examine these contentions.

Inability of a Union to Raise Wages per Man

J. R. McCulloch is sometimes pictured to be one of the most hostile of the classics in his attitude toward unionization. In point of fact he insisted that under no circumstances was there justification for legislation to prevent workers from organizing. But he argued that a union was incapable, except under certain special circumstances, of raising the wage rate per man. A number of reasons are given for this view.[80] Employers can endure lengthy strike action more easily than the labour force, they are likely to introduce strike-breakers from other districts and industries, and—of particular significance—they are likely to adopt capital-intensive methods: "The substitution of machinery for manual labour, and its improvement, has done more perhaps than anything else to put down combinations in manufacturing employments."[81] Accordingly, a union "to raise wages above their proper level, must cure itself".[82] It may be noted that it is not the *actual* payment of a higher wage rate which stimulates employers to adopt capital-intensive methods, but rather the desire to escape reliance on techniques which are liable to be brought to a stand by strike activity.

Even in cases which are most favourable to labour, namely where the union is not confined to a single district but includes "all the work-people employed in one or other of the great departments of industry", union pressure to raise wages above the competitive rate cannot succeed. The ultimate weapon available to capitalists is simply the diversion—in the long run—of their capital abroad: "No doubt there is generally a considerable disinclination to employ capital abroad. But that disinclination has its limits, and may be overcome either by the temptation of greater profits, or by the desire to emancipate oneself from the dictation of work-people."[83] McCulloch summarized his basic position as follows:

> No bad consequences can result from the exercise of this power [of combination] on the part of the workmen. If the price they demand for the labour be unreasonable, the masters may, and always *do*, refuse to employ them; and as they cannot afford to live for any considerable period without employment, it is plain that all combinations to obtain

> an undue rise of wages, or to effect an improper purpose, carry in their bosom a principle of dissolution, and must speedily fall to pieces.[84]

In the discussion thus far, it was presumed that workers were attempting to obtain "unreasonable" wages by which term McCulloch referred to wage rates in excess of the competitive rate. McCulloch qualified his argument to allow for instances where the wage rate is initially *below* the competitive rate as a result of monopsonistic pressure on the part of employers. In such cases union counterpressure is likely to succeed in its objective to raise wages, and indeed its "object is proper and desirable":

> Few masters willingly consent to raise wages; and the claim of one or of a few individuals for an advance of wages is likely to be disregarded so long as their fellows continue to work at the old rates. . . . And hence it is obvious, that without the existence either of an open and avowed, or at least a tacit and real combination, workmen would not be able to obtain a rise of wages by their own exertions, but would be left to depend on the competition of their masters.[85]

Nevertheless, immediately after supporting unions in instances of initially depressed wages, McCulloch added that monopsonistic pressure by employers can in any event be temporary only and is likely to collapse of its own accord, since additional capital would be attracted into the industry by the super-normal profits currently available as a result of the monopsony. Increased competition for labour would then raise wages to their "proper" level "without any effort on the part of the workmen". It is evident that the entire rationale for McCulloch's optimism in this regard lies in the implicit assumption that the competitive process is generally operative over wide areas of economic activity, and that entry of new firms into the industry in question is in no way blocked.

Consequences of Union Activity

According to McCulloch's analysis, unions are incapable of raising wages per man except where initially wages are below the competitive level. Even in the latter case, it was presumed that the competitive rate would ultimately be paid in the absence of union pressure. Accordingly, McCulloch took the position that "no bad consequences can result" from union activity.

Other classical economists, on the other hand, envisaged the possibility that unions might succeed in raising the wage rate above the competitive level. According to J. S. Mill, for example, the circumstances most conducive to union success occur "in trades where the workpeople are few in number, and collected in a small number of local centers".[86] Only then will their organization be sufficiently effective. Nonetheless, Mill seemed to regard success as the exception rather than the rule.[87] The Hand-Loom Weavers Commission, under the direction of N.W. Senior, was more explicit and related success to the technical significance of the group represented by the union in the production process. Where a group of workers is essential to an entire process, it will be in an ideal position to exert pressure successfully:

> A combination frequently succeeds in effecting its immediate purpose, when the inactivity of the workmen in combination, can produce the further effect of throwing out of employment other and more numerous sets of workpeople, or render useless a large amount of fixed capital.[88]

Elsewhere, Senior recognized that it is in periods of high activity that union pressure is likely to be greatest rather than during depressed periods:

> In every manufacture there are times when trade is bad. . . . In such cases combinations are generally quiet. They cannot alarm their masters by threatening them with a strike, for the masters themselves are anxious to diminish or even suspend their operation. . . . But when trade is good . . . when the manufacturers are enlarging their works . . . the committees think that the masters are in their power and try to put their laws into exertion.[89]

We shall consider then the further consequences of union activity according to Mill and Senior.

Labour Immobility

We have seen earlier that the classical writers, including Adam Smith, all recognized the presence of institutional restraints on mobility. The *Wealth of Nations* emphasizes apprenticeship laws and laws relating to corporations. Later writers paid particular attention to the poor laws and to the effects of combinations.

In the report of the Hand-Loom Weavers Commission unionization was stressed as a cause contributing to the long-run depressed state of hand-loom workers. Technical change had rendered hand-loom work obsolete, and yet, according to the Commission, labour was unable to transfer to other industries because of the exclusive behaviour of unions elsewhere: "The great cause of distress in the depressed branches of their business is the number of persons employed in it, or seeking employment, in proportion to the demand for their labour. The remedy of course must be that a portion of them should transfer their own labour, or at least that of their own children, to better paid occupations, but from these they are repelled by combinations."[90]

The argument of the Commission with regard to the impediments to mobility imposed by unions was accepted by Mill.[91] Yet Mill was unwilling to condemn unions out of hand on these grounds. He insisted that the problem must be evaluated within a wider context encompassing the issue of population, as we shall see.

Unemployment

We have considered a case where unemployment initially generated by technical progress has been prolonged as a result of the inability of labourers to enter other trades. But the direct effect of unions on employment also was considered by the classics.

We deal first with the discussion of J. S. Mill. Mill analyzed the consequence of unionization of the entire labour force. Any such attempt to raise the average wage rate must generate unemployment: "But if they aimed at obtaining actually higher wages than the rate fixed by demand and supply—the rate which distributes the whole circulating capital of the country among the entire working population—this could only be accomplished by keeping part of their number permanently out of employment."[92] A successful attempt by an individual union to raise wages above the competitive level will damage workers' interests elsewhere in the economy: "This high remuneration either causes fewer persons to find employment in the trade, or if not, must lead to the investment of more capital in it, at the expense of other trades: in the first case, it throws an additional number of labourers on the general market; in the second, it withdraws from that market a portion of the demand: effects, both of which are injurious to the working classes."[93] Presumably one may conclude that either wages will decline in non-unionized sectors; or, if in fact there occurs no decline so that the average wage rate rises, unemployment will be generated. Thus Mill's basic conclusion is that although union activity—by workers as a whole or by a single group—may raise the average real wage rate per man employed, it cannot do so without generating unemployment. It is interesting that a similar conclusion was reached by the members of the Political Economy Club in 1832 and 1833: union activity had, it was argued, succeeded in raising the real wage rate but only by generating unemployment.[94]

An important qualification must be made to Mill's general position. Mill adopted the argument that non-unionized labour would suffer a serious disadvantage in monopsonistically controlled markets. Where monopsony pressure succeeds in depressing wages, union counterpressure is then *essential* to assure that wages are maintained at the "competitive" rate.[95] Unlike McCulloch, Mill did not express the belief that even in the absence of union pressure the wage rate would be forced up to the competitive rate by the entry of new firms.

The Hand-Loom Weavers Report similarly emphasized the direct effects of unions upon unemployment. In point of fact the conditions for success by unions in most branches of hand-loom weaving were absent. But to the extent that in particular branches unions succeeded in enforcing minimum wage rates, unemployment tended to be the consequence during depressed seasons. Thus the argument of one witness was accepted that only flexible wages would assure full employment over the "cycle":

> I have no doubt that the effect would be to procure for the weavers nearly constant employment throughout the year .... If the Yorkshire principle [of flexible wages] were acted upon here, we should not turn our weavers off, but reduce their wages in a slack time, and advance them when trade becomes more active. My impression is, that the average rate of wages would be fully equal to what is now paid at the time when he is employed, and the weavers would have the advantage of constant work, instead of being out of employment a third of the year, and some much more.[96]

Furthermore, capital is likely to be repelled from a unionized sector because of the high labour costs and the restraints imposed against the use of the most profitable methods.[97] Elsewhere, Senior used particularly strong language to describe the ultimate effects of "successful" union activity:

> If [the employer] submit, they proceed to order him to raise the wages of his inferior men, and to lower those of his best workmen; they forbid him to pay by the piece; they forbid him to discharge any one for misconduct, or to take any fresh workmen except those whom they may choose to send to him; and often they prohibit his using machinery, or materials which they think may enable him to do with less human labour.[98]
>
> By reducing all to the level, by preventing any one from being rewarded for good conduct or discharged for bad conduct—by destroying all motives to exertion they ruin the energy, the industry, and the character of the workmen. By spoiling their workpeople, by forcing them to give extravagant law, and by interfering with the management of their businesses they make the trade of the masters unprofitable. Some are ruined, some turn all their capital into money; and others give up business or remove to America or to some part of the continent of Europe in which the wisdom of the people or the wisdom of the government, prevents such follies and crimes. But the workpeople remain. Some try to learn new businesses, some live on the charity of their friends, and some find refuge in the poorhouse.[99]

The ultimate conclusion, therefore, according to Senior and the Commissioners in 1841 was that "the tendency of combinations has been precisely the reverse of their object, and that, as hitherto directed, they have led to the positive deterioration of the wages and the condition of those who have engaged in them, and of the far more numerous body who are excluded from them".[100]

It is important to note the fact that in sharp contrast to McCulloch and Mill, Senior and the Commission denied categorically that employers exerted significant monopsonistic pressure:

> It is a prevalent notion that, as workmen have a common interest in raising wages, so masters have a common interest in lowering them—and that as the workmen combine against a workman who accepts low wages, so the masters combine against a master who gives high ones. This opinion is the . . . reverse of the fact. As the price of every commodity depends on its average cost of production, it is the interest of every master that the cost of every producer but

> himself should be as high as possible, since on that cost will depend how much he can ask for what he produces himself.[101]

Unions and the Population Issue

J. S. Mill refused to condemn unions out of hand, although he accepted the view of the Hand-Loom Weavers Commission that movement out of depressed trades was impeded by union activity: "Notwithstanding, however, the cruel manner in which the exclusive principle of these combinations operates in a case of this peculiar nature, the question, whether they are on the whole more useful or mischievous, requires to be decided on an enlarged consideration of consequences, among which such a fact as this is not one of the most important items."[102] The problem of inadequate restraint over the rate of growth of population was of overwhelming importance. And generally, Mill was willing to tolerate unions which succeeded in raising wages over the competitive level despite the nefarious effects on the non-unionized sector:

> If the present state of the general habits of the people were to remain for ever unimproved, these partial combinations, in so far as they do succeed in keeping up the wages of any trade by limiting its numbers, might be looked upon as simply intrenching around a particular spot against the inroads of over-population, and making the wages of the class depend upon their own rate of increase, instead of depending on that of a more reckless and improvident class than themselves. What at first sight seems the injustice of excluding the more numerous body from sharing the gains of a comparatively few, disappears when we consider that by being admitted they would not be made better off, for more than a short time; the only permanent effect which their admission would produce, would be to lower the others to their own level.[103]

It will be recalled that precisely the same argument was used by Mill to justify monopoly returns to skilled trades created by the inability of unskilled workers to finance training.

The unionization of workers in skilled trades was interpreted by several members of the Political Economy Club to be the manifestation of a change in the "cultural" minimum living standard. Thus the rise in real wages in certain skilled trades which had been recognized was explained in the following terms:

> Mr. Tooke thought it was chiefly to be resolved into moral causes inducing such combinations, activity, determination of purpose, limitation of apprenticeship in trades, and so forth on the part of artisans, whose wants and comforts having been enlarged would not suffer a reduction of their acquired advantages, and also from the greater weight of public opinion and popular feeling which supported them against the capitalist. Mr. Malthus and myself [J. L. Mallett] coincided with this opinion, and also thought that although the wages of all persons employed had thus been kept up, somewhat artificially, the consequences had been to limit employment. . . .[104]

Unions and the Wages Fund

We have seen that according to Mill and other classical writers, although union activity might succeed in raising the average wage per man, it cannot succeed in raising aggregate wage income *at full employment*. It is sometimes presumed that the classics used the wages-fund doctrine as an argument to prove the inability of organized labour to raise aggregate wages on the grounds that a certain predetermined wages bill is available and cannot be varied. In fact, this does not appear to be true of McCulloch or Senior. In the above discussion of their positions regarding unions, there were no references to the wages-fund theory.[105] On the other hand, Mill's analysis of unionization of the entire labour force and of local unions might be so interpreted. But in the light of what has been said earlier in this chapter regarding the so-called "fixity" of the wages fund, it appears more likely that Mill was simply expressing the view that where a unique full-employment wage rate exists, any attempt to impose a minimum wage rate above this level must generate unemployment. This result will follow whatever particular theory underlies the demand curve.

Although it is not essential to interpret Mill's position in terms of a rigid wages fund, it is essential to remain aware of the fact that in the classical system the demand for labour depends in some sense upon the size of the capital stock. An increase in the equilibrium, or full-employment, wages bill can only be accomplished by means of an increase in the capital stock (or a reduction in the working population). Trade unions are unable to raise aggregate full-employment wages, and a permanent solution to low wage incomes must be sought in the forces determining the relative growth rates of capital and population.

The criticisms directed against the wages-fund theory by W. T. Thornton, which were ultimately accepted by J. S. Mill in 1869, had great implications for any evaluation of the effectiveness of union activity. According to the "new view", the labour market cannot be analyzed in competitive terms and "bargaining" must be relied upon. Since the wage rate depends upon the relative bargaining strengths exerted by the employers and workers, unions might obtain increased wages per man and increased aggregate wages at no cost in terms of diminished employment opportunities. We have already noted that the change in attitude was incorporated into the final edition of the *Principles* published in 1871.[106]

SUMMARY

The most significant feature of the classical analysis of the labour market is the key role played by the capital stock and, accordingly, the determinants of net investment. A permanent increase in labour income requires increased investment and in the absence thereof pressure exerted by organized labour will be nugatory. In fact to the extent that union activity threatens the profitability of operations, there may follow a reduction in the rate of growth of capital.

It was, however, in the hands of the working classes to influence their own welfare. For even an increase in the capital stock would not be permanently effective in raising wages per man if workers responded to temporarily high wages by unrestricted population expansion. We have seen the great emphasis that was placed upon the Malthusian principles of population by Ricardo. And although many classical economists tended to play down the contemporary relevance of the issue, it was again given great emphasis in the work of J. S. Mill.

It was largely on the grounds that all increases in real wages per head would be eliminated by population growth that Mill refused to condemn the monopolistic behaviour of skilled workers who in well-organized unions managed to obtain relatively high earnings. Mill took this attitude in spite of evidence that workers in depressed industries were unable to escape because entry into other (unionized) trades was closed to them.

On similar grounds, Mill was willing to tolerate large differentials between the earnings of skilled and unskilled labour due to the inability of the latter to finance the necessary education and training.

We have noted that there was no call for government support of vocational training to overcome impediments to upward mobility of labour. The classics, in the main, limited their case in favour of government support to elementary education only. It is to be noted, however, that the classics for the most part simply took it for granted that the market can be relied upon to generate supplies of skilled labour in requisite amounts. This position was not a matter of doctrine or principle. For example, Adam Smith implied that in the case of an economy in flux where changes in process are frequent there may well occur discrepancies between social and private returns which would justify government intervention. And it is quite probable that Mill would have gone far toward developing a case for government support of vocational training in the event that the population problem had been resolved.

The principal theoretical weakness of the classical analysis of the labour market is the failure to provide a sound treatment of the demand for labour. In particular, the classics failed to explain satisfactorily why employers increase the quantity of labour services used in response to a reduction in the wage rate. This is strikingly demonstrated by the fact that Mill in 1869 rejected everything he had formally written over several decades regarding the demand for labour and stated categorically that demand was *not* in fact responsive to wage-rate reductions.

The basic reason for the confusion in the literature seems to lie in the assumptions made with regard to the relationship between labour and other inputs. The essential contribution of the post-classical economists was the widespread use of the "principle of substitution" in production (and consumption) theory. It was assumed that the entrepreneur is faced with alternative methods of production and will make his choice between them on the basis of the relative prices of factors. A fall in the price of labour, for example, will *ceteris paribus* lead to the adoption of labour-intensive methods. But even in the short run, where the fixed capital stock is a constant, it is assumed to be possible to "substitute" labour for capital by using the given capital more intensively so that the ratio of labour to capital rises. Moreover, a fall in the wage rate will affect industries which rely on labour-intensive methods more sharply than industries where the degree of mechanization is greater. In this case "substitution" occurs as the former industries tend to expand at a faster rate than the latter. Thus by numerous channels a fall in the wage rate will stimulate a greater demand for labour services. The classical economists ruled out such opportunities by assuming a great degree of rigidity between labour and other factors and hence, with the analytical techniques available to them, were unable to justify satisfactorily a demand curve for labour of negative slope.

A further major difference between the economists of the classical period and those of the present time is the attitude to purely "monetary" disturbances to the level of activity. The classics presumed that a mechanism existed within the system which would rapidly correct any inadequacy in the aggregate demand for product. The difference reduces to a matter of assumptions. The classics implicitly presumed that prices and money wages are flexible downward and utilized this assumption in developing their case that excess supply can represent only a temporary disturbance. Today economists have little confidence in such an assumption.

Although the classics minimized the significance of monetary disturbances, some attention was paid to the problem of technological unemployment and to the possibility that, generally, labour incomes might in aggregate be reduced by the adoption of capital-intensive techniques. Such eventualities would probably be counterbalanced in the long run, it was argued, by the general expansion of the capital stock and accordingly in the demand for labour which was likely to occur in response to new profit opportunities created by the new technology. But the significance of capital accumulation was thus further enhanced.

NOTES AND REFERENCES

[1] The dates in parentheses refer to the first publication of the principal work of the relevant author to which reference is made in the chapter.

[2] All page references will be to Smith, Adam, *Wealth of Nations*, Modern Library, New York, 1937.

[3] *Wealth of Nations*, pp. 79-80. This general view was reflected in a report (1816) by a Committee of the House of Commons appointed to investigate the operation of the Poor Laws:

> If the demand for labour increases faster than the supply, high wages are the natural result;—labourers are enabled to provide better for their children; a larger proportion of those born are reared;—the burden, too, of a large family is rendered lighter; and in this manner the marriage and multiplication of labourers are encouraged, and an increasing supply is enabled to follow an increased demand. If, on the contrary, the waste or diminution of wealth, should reduce the demand for labour, wages must inevitably fall, and the comforts of the labourer will be diminished, the marriage and multiplication discouraged until the supply is gradually adapted to the reduced demand.

Quoted by John Barton, *Observations on the Circumstances which Influence the Condition of the Labouring Classes of Society*, London, 1817, pp. 6-7.

[4] Malthus, T. R., *Essay on the Principle of Population*, first edition, London, 1798.

[5] In Malthus' initial formulation there was no sound theoretical basis to support the view that the potential growth of food supplies is limited compared with that of population. In later formulations the hypothesis was based more firmly upon the concept of diminishing agricultural returns. The interpretation of Malthus remains difficult, however, since it is often implied that returns in some sense diminish even when technological improvements and changes in the system of land tenure and other forces influencing output are taken into account. Strictly speaking, the concept of diminishing returns is meaningful only on the assumption of given technology and organization.

Smith's optimism regarding the path of actual real wage rates referred to in the text may be partly explained by the insignificant role played in his system by diminishing agricultural returns.

[6] All page references are to Sraffa, P. (ed.), *The Works and Correspondence of David Ricardo*, Vol. I, *Principles of Political Economy*, Cambridge University Press. Cambridge, 1951. Cf. in particular p. 95.

[7] *Ibid.*, p. 98. This conclusion is preceded by the following distinction:

> In new settlements, where the arts and knowledge of countries far advanced in refinement are introduced, it is probable that capital has a tendency to increase faster than mankind: and if the deficiency of labourers were not supplied by more populous countries, this tendency

would very much raise the price of labour. In proportion as these countries become populous, and land of a worse quality is taken into cultivation, the tendency to an increase of capital diminishes; for the surplus produce remaining, after satisfying the wants of the existing population, must necessarily be in proportion to the facility of production, viz. to the smaller number of persons employed in production.

[8] Elasticity of supply refers to the percentage change in the quantity of labour supplied in response to a given percentage change in the wage rate. Ricardo's emphasis was upon a limiting case where the elasticity may be said to be "infinite". If we consider a wage rate slightly above "subsistence", then we might forecast in the long run an indefinite increase in the population.

[9] *Principles, op. cit.*, Chapter 5, "On Wages" and Chapter 16, "Taxes on Wages".

[10] *Wealth of Nations, op. cit.*, p. 821.

[11] *Principles, op. cit.*, p. 96.

[12] A wage rate below the minimum would in this case lead to a reduction in population via a reduced birth rate (rather than an increased death rate).

[13] References are to *Collected works of John Stuart Mill*, Vols. II and III, *Principles of Political Economy*, University of Toronto Press, Toronto, 1965. Mill emphasized above all the role of good state-supported elementary education as a means of raising working-class expectations: "the aim of all intellectual training for the mass of the people, should be to cultivate common sense; to qualify them for forming a sound practical judgement of the circumstances by which they are surrounded" (p. 375). But he feared that such education would be useless while workers were actually in a state of destitution. He therefore recommended that the state take direct action to raise living standards, for example by supporting emigration and thereby reducing the population. If this might be done on a sufficiently large scale, then "comfort can be made as habitual to a whole generation as indigence is now" (p. 378). The training of this generation, would, he argued be effective in "accomplishing those moral and intellectual improvements in all classes of the people, the very poorest included, which would render improbable any relapse into the over-peopled state" (p. 378).
Government support of emigration was recommended in all the first five editions of the *Principles* (1848, 1849, 1852, 1857, 1862). But in the sixth (1865) and seventh (1871)—the last published during his lifetime—Mill added that economic circumstances were tending to make such intervention unnecessary.

Emigration was being undertaken on private initiative on a considerable and growing scale following technical improvements, which cheapened transportation, and improved knowledge of opportunities abroad. This increased mobility and "the flush of prosperity occasioned by free trade, have granted to this overcrowded country a temporary breathing space" which may be used to raise by education working-class expectations, and an increase in the minimum acceptable "cultural" standard of living (p. 378). Mill's attitude remains ambiguous, however, for at other places one finds even in the seventh edition a call for continued government support of emigration, cf. p. 967. (See also note 103 below.)

It will be noted that *it is not the actual increase in living standards which raises expectations directly*, but rather the effectiveness of a good educational program. Without the latter, the increased standards could be temporary only.

[14] Longfield, S. M., *Lectures on Political Economy* (delivered 1833, published 1834) reprinted by the London School of Economics and Political Science, London, 1931, p. 262.

[15] McCulloch, J. R., *Principles of Political Economy*, fifth edition (1864), New York, 1965, p. 333. McCulloch's objections to Malthus were stated in strong terms in the Preface to the third edition (1842), pp. xv-xvi:

> The recent history of the theory of population affords a striking instance of the abuse of general principles, or rather of the folly of building exclusively upon one set of principles, without attending to the influence of the antagonist principles by which they are partly or wholly countervailed. The principle of increase, as explained by Malthus, and afterwards by Chalmers, appeared to form an insuperable obstacle to all permanent improvement in the condition of society, and to condemn the great majority of the human race to a state approaching to destitution. But further inquiries have shown that the inferences drawn by these and other authorities from the principle now referred to, are contradicted by the widest experience.

[16] Senior, N. W., *An Outline of the Science of Political Economy* (1836), London, 1951, p. 38. See also *Commission for Inquiring into the Condition of the Unemployed Hand-Loom Weavers in the United Kingdom*, Parliamentary Papers, 1841, X, 63, written under Senior's direction.

Much is made by some commentators of Malthus' own admission first introduced into the second edition of the *Essay on Population*, 1803, that workers might exercise "moral constraint". But it is clear that he remained unconvinced by his own admission. Cf. Correspondence between Malthus and Senior (1829) in Senior, N. W., *Selected Writings on Economics*, New York, 1966, pp. 55 ff.

Robert Torrens, *Wages and Combination* (1834) also categorically denied the Malthusian doctrine: "There is no tendency in Population to increase faster than Capital, and thus to degrade Wages" (p. 27). This fact, he argued, would have been more in evidence were it not for the Poor Laws and other legislation which "give a bounty to over-population", and the attitude of the public which considers "prudence and precaution in entering upon the marriage state, and in limiting the numbers of families" as "being objects of censure and dislike" (p. 31).

It is reported that the members of the Political Economy Club meeting in London (February 6, 1835) debated and rejected the Malthusian mechanism:

> The next question was really a question as to the value and truth of the Principles of the Essay on Population, and the whole artillery of the Club, was, strange to say, directed against it. Far from population having a tendency to increase faster than subsistence, Senior and Tooke held that there were facts enough to prove that the reverse was the case, and as to McCulloch who is always bitter against Malthus, the workings of an envious and mean disposition, he held that there was in human nature a principle of improvement and exertion that was at all times sufficient to counteract and overcome the principle of population, and therefore that Malthus' theory was altogether erroneous, or as he expressed it in his own happy language, false. Torrens likewise attacked the principle of the Essay and said that if it were correct, no savage nation could have escaped from their barbarous state. . . .

Political Economy Club, Vol. VI, London, 1921, pp. 264-265.

[17] A particularly important contribution to the study of the individual's supply of labour services in terms of a comparison of the disutility of effort and the utility of income was made by the post-classical economist W. S. Jevons in *The Theory of Political Economy*, London, 1871.

[18] A detailed treatment of the issue and many of the topics discussed in this section will be found in Taussig, F. W., *Wages and Capital*, New York, 1906. No attempt is made in this chapter to give an exhaustive treatment of the subject.

[19] Smith, for example, referred repeatedly to the notion of wages destined to be paid to labour. We give one extract here: "The demand for those who live by wages, it is evident, cannot increase but in proportion to the increase of the funds which are

destined for the payment of wages." *Wealth of Nations, op. cit.*, p. 69. An unambiguous statement by J. S. Mill of the constancy of aggregate annual wages is reproduced on page 65.

[20] The rationale for this assumption is examined later in this chapter in the discussion of Say's Law (pages 73 ff).

[21] For a similar conclusion cf. Blaug, M., *Ricardian Economics: A Historical Study*, Yale University Press, New Haven, 1958, p. 123; Robbins, L., *The Theory of Economic Policy in English Classical Political Economy*, Macmillan, London, 1953, 110 *n.*; Schumpeter, J. A., *History of Economic Analysis*, Allen and Unwin, New York, 1954, p. 666.

[22] Schumpeter, *ibid.*, pp. 641-642.

[23] Walker, F. A., *The Wages Question*, New York, 1876, p. 130.

[24] *Ibid.*, p. 137.

[25] "Thornton on Labour and Its Claims, Part I", *The Fortnightly Review*, May 1869, p. 515. If we designate C' as the wages fund and w as the average wage rate per man, then the quantity of labour demanded, P, can be written as a function of the wage rate in the form: $P = \frac{C'}{w}$.

[26] One authority has written: "Although the theory was frequently presented as an ordinary case of the working of the law of demand and supply, no notion of a schedule of demand and supply prices was presented and no attempt was made to define a true equilibrium wage rate." (Blaug, M., *Economic Theory in Retrospect*, Homewood, 1962, p. 170.) It is clear, however, from Mill's account of the demand for labour (see previous note), that a genuine schedule of demand *was* envisaged in fact. That an attempt was made to define a true equilibrium wage rate will be seen by reference to Mill, *Principles, op. cit.*, p. 356.

[27] The arguments in the remainder of this section are examined in greater detail by the present writer in "Technology and Aggregate Demand in J. S. Mill's Economic System", *Canadian Journal of Economics and Political Science*, XXX, May 1964, pp. 175-184; "Some Technological Relationships in the *Wealth of Nations* and Ricardo's *Principles*", *CJEPS*, XXXII, May 1966, pp. 184-201.

[28] Thornton, W. T., *On Labour*, first edition, London, 1869.

[29] "Thornton on Labour and Its Claims", *op. cit.*, p. 516.

[30] There may in fact be a wage rate above which the demand for labour falls suddenly to zero, and a wage rate below which the supply falls to zero. The important feature is that there is some *range* of wages over which the curves of demand and supply coincide.

[31] Edgeworth, F. Y., *Mathematical Psychics*, London, 1881.

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[32] Cf. Foldes, Lucien, "A Determinate Model of Bilateral Monopoly", *Economica*, XXXI, May 1964, pp. 117-132, for a summary of bargaining theories and for the development of a model in which the ultimate result is actually determinate.

[33] Cairnes, J. E., *Some Leading Principles of Political Economy Newly Expounded*, New York, 1874.

[34] *Ibid.*, pp. 186-187. See also an earlier account by Torrens, R., *Wages and Combination, op. cit.*, pp. 16-18.

[35] *Ibid.*, p. 174. We may formalize Cairnes' argument in simple equations. The quantity demanded of labour in aggregate (P) is dependent upon the aggregate capital stock (C), the technically determined constant ratio between labour and non-labour inputs, which we refer to as "fixed capital" (λ), and the wage rate (w), and may be written as

$$P = \frac{C}{1/\lambda + w} \ldots (1)$$

This is derived directly from the constraint that total capital is made up of fixed capital (M) and wages capital (wP), that is $C = M + wP$. Replacing M by P/λ we may immediately obtain expression (1).

The supply of labour (S) is a given amount. Equilibrium will be assured by the full employment condition

$$P = S \quad \ldots (2)$$

and the wage rate may be immediately obtained by inserting expression (1) into (2) since w is the only unknown to be determined. Thus

$$S = \frac{C}{1/\lambda + w}$$

and

$$w = \frac{C}{S} - 1/\lambda \quad \ldots (3)$$

Expression (3) may be compared with the simple wages-fund theory which is written as

$$w = \frac{C'}{S}$$

where C' refers to *circulating* capital (or wage capital) only, in contrast to C in the present model which refers to *total* capital —that is, wage capital and fixed capital. According to the simple theory, the wage rate is determined as soon as we know the amount of capital to be devoted to wage payments, and the working population. According to the present theory the amount of wage payments is not given independently of the size of the working population.

[36] See, for example, the discussion below of technological change, pp. 77 ff.

[37] Numerous examples may be given of statements in the classical literature which appear to take it for granted that saved income will be invested without reference to a "mechanism" which assures this result. For example, according to the *Wealth of Nations*: "What is annually saved is as regularly consumed as what is annually spent, and nearly in the same time too" (p. 321); and according to McCulloch, *Principles*: "Hoarding is no longer practised in any country in which property is protected. Wherever this is the case, all savings go to swell, directly or indirectly, the amount of the fund for the employment of labour" (p. 318).

A brilliant discussion allowing for the possibility of excess supply is in Mill, J. S., "On the Influence of Consumption on Production," in *Essays on Some Unsettled Questions of Political Economy*, first edition, 1844, reprinted by the London School of Economics and Political Science. London, 1948.

[38] The essence of the matter lies in the assumption that the community wishes to hold a certain command over goods and services in the form of money balances. It is not, therefore, the nominal stock of money balances which is relevant, but the "real value" of the stock. A fall in money prices raises the real value of any given stock. Accordingly, the desire to add to money balances will be "satisfied" by a rise in the real value of the nominal money stock.

The mechanism under discussion was more commonly discussed within the context of the effects of changes in the money supply than that of unemployment. Therefore, it is more accurate to regard the process of correction as implied in the classical literature.

In the case of J. S. Mill (see previous note) emphasis is placed on the view that the expectation of, and the desire to avoid, rising prices will stimulate increased purchases of goods and services and render a depression due to an excess supply of goods and services temporary only.

Mill stated carefully that in depressions capital will remain unused, or in effect the demand for labour will fall: "Capital which the owner does not employ in purchasing labour, but keeps idle in his hands, is the same thing to the labourers, for the time being, as if it did not exist. All capital is, from the variations of trade, occasionally in this state" (*Principles*, *op. cit.*, p. 338). This admission confirms the view expressed above that the wages fund was not regarded as "unchangeable".

[39] For a full examination of the literature on the present topic see Becker, G. S. and Baumol, W. J., "The Classical Monetary

Theory: The Outcome of the Discussion", *Economica*, XIX, November 1952, pp. 355-376.

[40] Malthus, T. R., *Principles of Political Economy*, second edition (1836), New York, 1964.

[41] *Essays, op. cit.*, pp. 72-74.

[42] *Principles, op. cit.*, p. 68.

[43] *Loc. cit.*

[44] The analysis discussed in this subsection is of great relevance in the classical literature. Two implications will be noted briefly. First, the analysis is consistent with the "alternative" theory of wage-rate determination, which we considered earlier in the chapter, according to which aggregate labour income is determined as the *competitive outcome of a demand-supply* equation, and hence *will depend upon the actual size of the working population.* For when the labour supply is constant the *entire* increase in capital, as we have seen, "becomes" higher wage income. Yet Mill stated, "I do not mean to deny that capital, or part of it, may be so employed as not to support labourers, being fixed in machinery, buildings, improvements of land, and the like. In any large increase of capital, a considerable portion will be thus employed . . ." (*Principles, op. cit.*, p. 66). This latter qualification can refer only to the case where population is rising. Thus it is evident that the division of total capital, and accordingly the size of circulating capital, depends upon the work force itself, and is not given independently.

Second, some light may be thrown on a troublesome proposition to be found in the literature, namely that "the demand for commodities is not the demand for labour". This does not represent the view that demand for final product is irrelevant in decisions to employ labour. It refers to the view that if we compare two economies, identical in all respects except that in one the rate of expenditure on *direct services* or the rate of *investment* is larger than in the other, then it will be found that labour income will there be greater too. As we have seen in this section, an increase in investment at the expense of *outlays on consumer goods* by capitalists will dictate a higher wage rate in the case of a constant work force, and a larger wage bill. For a discussion of the proposition cf. Ricardo, David, *Principles, op. cit.*, pp. 392 ff.; McCulloch, J. R., *Principles, op. cit.*, pp. 356 ff; Mill, J. S., *Principles, op. cit.*, pp. 78 ff.

[45] These propositions are examined further in "Some Technological Relations in the *Wealth of Nations*. . . ." See note 27.

[46] For a full discussion see Gourvitch, Alexander, *Survey of Economic Theory on Technological Change and Employment*,

Works Projects Administration, National Research Project 1940, New York, 1966; and Neisser, H., " 'Permanent' Technological Unemployment", *American Economic Review*, XXXII, March 1942, pp. 50-71.

[47] McCulloch, J. R., *Principles, op. cit.*, p. 149.

[48] *Loc. cit.*

[49] Ricardo, David, *Principles, op. cit.*, Chapter 31; Mill, J. S., *Principles, op. cit.*, Book I, Chapter 6. The decline in the aggregate wages bill may be interpreted in terms of the relationship

$$P = \frac{C}{1/\lambda + w}$$

(see note 35 above). Here $1/\lambda$ rises as the equipment required per man rises, so that out of any given capital stock (C) a smaller labour force (P) can be supported at each wage rate. In brief, the demand schedule for labour shifts down.

[50] *Principles, op. cit.*, p. 392.

[51] *Ibid.*, p. 395.

[52] *Second Report from the Select Committee on Emigration from the United Kingdom*, Parliamentary Papers 1827, V, pp. 3-4.

[53] Certain aspects of the classical attitude to education are discussed in two recent papers: Miller, William L., "The Economics of Education in English Classical Economics", *Southern Economic Journal*, XXXII, January 1966, pp. 294-309; West, E. G., "Private versus Public Education: A Classical Economic Dispute", *Journal of Political Economy*, LXXII, October 1964, pp. 465-475.

[54] He emphasized in particular contemporary apprenticeship laws and laws relating to corporations (*Wealth of Nations*, Book I, *op. cit.*, Chapter 10). In the nineteenth century considerable stress was placed upon the effects of the Poor Laws. The system whereby the unemployed poor were maintained out of local rates was complemented by certain constraints on settlement which were imposed upon workers and which adversely affected labour mobility:

> It appears from the evidence, that the existing modes by which a settlement can be changed are productive of injury and fraud, and that they tend to injure the employers of labour by restricting them in the choice of their servants, the owners of property, by distributing the labouring families according to rules not depending on the demand for their services, or the fund for their support, and above all the labourers themselves, by depriving them of the power of selling all that they have, their labour, to the best advantage.

Report from His Majesty's Commissioners for Inquiring into the

Administration and Practical Operation of the Poor Laws, Parliamentary Papers, 1834, XXVII, p. 193. The impediments imposed by unions will be discussed below.

[55] *Wealth of Nations, op. cit.*, p. 100. Smith regards monetary differentials to be "compensating" payments. Yet not all of the five features referred to are easy to interpret. In particular, the differential due to different degrees of trust is ambiguous. Smith implies that trust is burdensome. On the other hand, it might be argued that a monetary differential, because of a high degree of trust required, is a monopoly payment rather than a compensating payment, since only a limited number of people are deserving of trust. Cf. Mill, J. S., *Principles, op. cit.*, p. 385, for this objection.

The fifth feature refers to the argument that in equilibrium the monetary return should allow for the differing degrees of chance of success in the occupation: "In a perfectly fair lottery, those who draw the prizes ought to gain all that is lost by those who draw the blanks" (p. 106). In fact, Smith argues, people tend to overestimate their chance of outstanding success and crowd into professions which promise a small likelihood of very great profits, so that what may appear to be very large monetary payments are in fact lower than they would be were people's calculations more realistic. This, too, should have been recognized as an impediment in the process of relative wage-rate determination.

The second feature might be of less consequence if earnings over an entire lifetime are compared between occupations. And the third feature will disappear if annnual earnings are compared.

[56] *Ibid.*, p. 114.

[57] *Ibid.*, pp. 436-437.

[58] *Ibid.*, p. 123.

[59] *Principles, op. cit.*, p. 101.

[60] *Wealth of Nations, op. cit.*, p. 737.

[61] *Principles, op. cit.*, p. 386.

[62] *Ibid.*, p. 387. Much emphasis was given to the notion of "non-competing industrial groups" by J. E. Cairnes, *Some Leading Principles of Political Economy* (1874):

> What we find, in effect, is, not a whole population competing indiscriminately for all occupations, but a series of industrial layers, superposed on one another, within each of which the various candidates for employment possess a real power of selection, while those occupying the several strata, are, for all purposes of effective competition, practically isolated from each other. (p. 66)

[63] *Principles, op. cit.*, p. 383. (Emphasis added.)

[64] *Wealth of Nations, op. cit.*, pp. 129-130.

[65] *Ibid.*, p. 131.

[66] *Principles, op. cit.*, pp. 388-389.

[67] Thus for example: "Since reading and writing have been brought within the reach of a multitude, the monopoly price of the lower grade of educated employments has greatly fallen, the competition for them having increased in an almost incredible degree" (pp. 386-387). "The changes, however, now so rapidly taking place in usages and ideas, are undermining all these distinctions; the habits or disabilities which chained people to their hereditary condition are fast wearing away, and every class is exposed to increased and increasing competition from at least the class immediately below it" (p. 388).

[68] *Ibid.*, p. 388.

[69] *Wealth of Nations, op. cit.*, p. 735.

[70] *Ibid.*, p. 737. The government would establish parish schools. But the teacher would be paid only in part from public funds. Parents would pay the remainder of his salary to assure against the "deriliction of his duty".

[71] *Principles, op. cit.*, p. 949. Mill argued that in practice the choice was not between pupils and individual outlays, but between public outlays and charity.

[72] *Ibid.*, pp. 107-108. Mill's evidence was taken from the *Report of the Poor Law Commissioners* in 1840.

[73] Senior, N. W., *Industrial Efficiency and Social Economy* in Levy, S. Leon (ed.), Vol. II, Henry Holt, New York, 1928, pp. 328-329, reproduced from Senior's lecture notes 1847-1848. The sharp awareness of the inability of workers to afford elementary education and the deficiencies in "intelligence" and "conscientiousness" which prevent private outlays even where they can be afforded is clear from the following statements by Senior:

> When I say that the interference of the state in the education of the higher and middle classes is not absolutely necessary, I do not mean to treat it as useless. I mean merely to distinguish the higher and middle classes from those who are unable to pay the whole, or any part of the expense, of a good education, and who must owe such an education wholly or partially to the care of the state, or the benevolence of individuals. (*Ibid.*, p. 333, reproduced from an Address on Education, London, 1863.)

> [We] may look forward to the time when the labouring classes shall possess the means, the intelligence, and the

> conscientiousness which will enable and induce them to give to their children a good education. But that time has not yet come. (*Ibid.*, p. 333, reproduced from *Suggestions on Popular Education*, London, 1861.)

Senior also referred to the effect of elementary education upon "security" and consequently upon wealth. *Industrial Efficiency*, Vol. I, pp. 193 ff, reproduced from lecture notes 1848-1849.

There are several other "cases" in favour of government support of elementary education in the classical literature. A particularly interesting argument is that developed initially by Malthus who emphasized that elementary education should include instruction in "the principle of population" and its consequences. Moreover, "if a few of the simplest principles of political economy could be added . . . the benefit to society would be almost incalculable". Malthus, T. R., *Essay on the Principle of Population*, Vol. 2, Everyman's Library, London, 1961, p. 211. See also note 13 above.

[74] *Wealth of Nations*, p. 742.

[75] *Ibid.*, pp. 737-738.

[76] *Principles, op. cit.*, pp. 968-969.

[77] *Ibid.*, pp. 947-948.

[78] See pages 88 and 90 in this volume and the relevant notes 67 and 72.

[79] *Commission for Inquiring into the Condition of the Unemployed Hand-Loom Weavers in the United Kingdom*, Parliamentary Papers, 1841, X, p. 120.

The argument was, however, severely qualified. In unskilled trades there was little hope that the labour supply could be permanently reduced, since even women and children were able to enter at will from outside. The only solution was to "raise the condition of the whole body of labourers" (p. 120), referring perhaps to an easing of the pressure of excess population.

It is in *skilled* trades, into which the unemployed cannot flood from outside, that elementary education is likely to be successful in reducing the labour supply.

In the report there is a suggestion that the state establish institutions of "design" with the aim of "increasing the number of good designers actually engaged in the business of manufacturing" (p. 81). But the basic objective was to increase the competitiveness of English cloth exports in the light of similar measures adopted by the French government. This appears to be the only case in the report for government support of training in skills. Certainly if the problem of acquiring skills was considered significant, it would have been emphasized in a study such as that of the hand-loom weavers' plight.

We may similarly refer to the fact that the *Poor-Law Report* (1834) has nothing to say about the problem involved in the acquisition of skills. State education would be strictly limited: "as soon as a good administration of the Poor Laws shall have rendered further improvement possible, the most important duty of the Legislature is to take measures to promote the religious and moral education of the labouring classes." *Op. cit.*, p. 205.

[80] *The Rate of Wages*, second edition 1854, New York, 1963, pp. 81 ff.

[81] *Ibid.*, p. 83.

[82] *Loc. cit.*

[83] *Ibid.*, p. 86.

[84] *Principles, op. cit.*, pp. 193-194.

[85] *The Rate of Wages, op. cit.*, pp. 79-80.

[86] *Principles, op. cit.*, p. 930.

[87] For example: "combinations to keep up wages are seldom effectual" (p. 931). Mill states that workers are more likely to succeed in obtaining reductions in hours than increases in wages (p. 929). It must be recalled that the unit which was always used by the classics was the wage per man, not the wage per hour.

[88] *Hand-Loom Weavers Report, op. cit.*, p. 32.

[89] *Industrial Efficiency, op. cit.*, p. 243. Reproduced from lecture notes, 1851-1852.

[90] *Hand-Loom Weavers Report, op. cit.*, p. 38. The emphasis throughout the discussion was upon the "tyranny of combinations" whereby workers were forced against their will to obey union officials. Legislation was recommended which would, according to the Commissioners, "release workpeople" from such pressure (p. 30). Moreover, the law, it was argued, should be directed against employers who encourage union activity by the workers of their competitors (p. 116). In effect the recommendations, had they been accepted, would have greatly hindered the development of a union movement in Britain. See a full discussion of the recommendations and an earlier representation to the government by Senior, in Bowley, Marian, *Nassau Senior and Classical Economics*, Kelley, London, 1949, pp. 277-281.

[91] *Principles, op. cit.*, p. 396.

[92] *Principles, op. cit.*, p. 930*n*. This appears in all editions until 1865. In the final edition published during Mill's own lifetime (the seventh in 1871) it is replaced by the following: "They would also have a limited power of obtaining, by combination, an increase of general wages at the expense of profits. But the limits of this power are narrow; and were they to attempt to

strain it beyond those limits, this could only be accomplished by keeping a part of their number permanently out of employment" (p. 930). The change in emphasis is to be explained probably by the adoption of Thornton's argument that the demand for labour is not responsive to wage reductions, so that the competitive market process is of little relevance. "Bargaining" must be relied upon to determine the ultimate wage rate. (See above pages 67 ff.) There are of course limits to any rise in wages, since beyond some level firms would be forced to close down.

[93] *Ibid.*, pp. 930-931.

[94] *Political Economy Club*, Vol. VI, *op. cit.*, pp. 234-235 and p. 246. The emphasis was upon successful union pressure in occupations "which require an apprenticeship and whose handicraft is more or less of the nature of skilled labour" (p. 246).

[95] *Principles, op. cit.*, p. 932.

[96] *Hand-Loom Weavers Report, op. cit.*, p. 35.

[97] *Ibid.*, pp. 32 ff.

[98] *Industrial Efficiency, op. cit.*, p. 243.

[99] *Ibid.*, p. 244.

[100] *Hand-Loom Weavers Report, op. cit.*, p. 31.

[101] *Ibid.*, pp. 113-114.

[102] *Principles, op. cit.*, p. 397.

[103] *Ibid.*, pp. 397-398. A subtle change of emphasis is to be noted between editions. In the first and second editions (1848 and 1849) Mill stated categorically: "I find it impossible to wish, in the present state of the general habits of the people, that no such combinations existed" (p. 397*n.*). In the third and fourth editions (1852 and 1857) Mill seemed to be less certain that unions are to be justified: "The time, however, is past when the friends of human improvement can look with complacency on the attempts of small sections of the community, whether belonging to the labouring or any other class, to organize a separate class interest in antagonism to the general body of labourers, and to protect that interest by shutting out, even if only by a moral compulsion, all competitors from their more highly paid department. The mass of the people are no longer to be thrown out of the account, as too hopelessly brutal to be capable of benefiting themselves by any opening made for them, and sure only, if admitted into competition, to lower others to their own level" (p. 397*n.*). Thereafter, as is clear from our own text, there seems to be a return toward the position of 1848. A similar change in emphasis appears toward the close of the book. In 1848 and 1849 Mill stated: "Combinations to keep up wages are therefore not only permissable, but

useful, whenever really calculated to have that effect" (p. 931*n.*), namely of protecting a group against population pressure exerted by the masses who are excluded. Thereafter, there seems to be greater doubt although on balance the impression is left that the population issue remained serious:

> If, therefore, no improvement were to be hoped for in the general circumstances of the working classes, the success of a portion of them, however small, in keeping their wages by combination above the market rate, would be wholly a matter of satisfaction. But when the elevation of the character and condition of the entire body has at last become a thing not beyond the reach of rational effort, it is time that the better paid classes of skilled artisans should seek their own advantage in common with, and not by the exclusion of, their fellow-labourers. (p. 931)

See also note 13 above.

[104] *Political Economy Club*, Vol. VI, *op. cit.*, pp. 245-246.

[105] In Taussig's exhaustive study of the issue, there is no evidence that the classics (prior to 1848) used the wages-fund theory to attack unions, *op. cit.*, Chapter 10.

[106] See note 92 above.

3

Technological Progress and Labour Displacement

Yehuda Kotowitz

There is a common belief, particularly among workers and union officials, that technical progress leads to displacement of labour by machinery. Technical progress (or "automation") is viewed as a process in which new machines using less labour can turn out greater quantities of product than the old machines, so that employment falls. This process, it is alleged, affects mostly semi-skilled workers, whose jobs can be easily performed by machines. Moreover, it is believed that this process is accelerating, thereby raising the spectre of increasing unemployment. It is therefore considered necessary to reduce the work week and decelerate the rate of automation in order to supply sufficient levels of employment for our growing labour force.

Most economists, however, tend to dismiss these arguments on the basis of the historical record. High rates of growth of the national capital stock and of the standard of living in the last century have not been accompanied by a trend of increasing mass unemployment. Some reduction of the work week as well as longer schooling have kept down the rates of growth of labour supply, but these would not have been sufficient to offset the supposed ill effects of automation. Thus, even though the negative impact of automation is possible according to economic theory, it presupposes some extreme assumptions about the nature of the economic and technological world that most economists are not willing to accept in view of past experience.

In this paper we shall try to examine this controversial issue from a theoretical point of view as well as present a statistical examination of the historical record.

Historical evidence alone is not conclusive in this matter, as the essence of technical progress is change. There is no guarantee that past historical trends can be projected automatically into the future. Thus it is important to investigate the nature of the process of technical progress and its possible effects on employment in a theoretically clear manner. This does not replace, but rather reinforces, the historical analysis, for it enables us to identify the crucial elements in the process of technical change and therefore to focus on them in the historical analysis. An examination of the historical record is necessary as it may help us to identify any trends toward changes in the process of technical change. Proponents of the "automation" view of technical change suggest that this process began in the 1950's and is currently accelerating. If their view is correct, it should be possible to identify these trends and their effects in the history of the late 1950's and early 1960's.

We shall first examine the nature of the demand for factors of production in any given technology. Next, we shall analyze the way in which technology as well as other economic variables may affect this demand. We shall contrast the effects on the individual firm or industry with those on the whole economy and use this framework to assess the historical evidence. The results of some preliminary statistical investigations regarding Canadian manufacturing industries will be presented and contrasted with the results of similar investigations in the United States. Finally, some tentative conclusions will be sketched briefly regarding the nature and effects of technical progress with respect to labour.

In order to understand how the process of technical change affects the level and composition of the demand for labour, let us first try to describe the way in which this demand is formed at any level of technology.

At any point in time a firm contemplating expansion of production of a given commodity is faced with a large array of possible techniques. Each technique may be represented by a combination of resources necessary to produce the given output. For simplicity we shall assume that only two resources, labour and capital, can be used in conjunction with a given amount of raw material to produce the finished product. Labour is measured by the number of some "uniform units" of man-hours, whereas capital represents the number of "units of machinery equipment and building" measured in terms of real dollars of expenditure on these items per unit of time. These definitions gloss over some difficulties involved in the diversity of the true units of labour and capital—however, most of the results will not be altered by the simplification.

The cost of each combination can be calculated easily by multiplying the quantities of each resource by its respective price. The firm will then choose the resource combination which will give it a minimum cost for the contemplated output.[1] This is clearly a somewhat simplified representation of the real decision process of the firm, as it must take into consideration possible future changes in output, prices of the various resources (inputs) and other factors, which may modify the exact simple calculation of minimum current cost. But given these, the process of choice consists essentially of choosing that input combination which will, on the average, minimize the firm's per unit costs throughout the forseeable future.

To the extent that these input proportions are fixed—once chosen—long-run expectations on both costs and possible selling prices will dominate the firm's decision. Otherwise, current costs only will determine the choice. Thus, if a type of machine is purchased which requires a given number of workers for maximum efficiency, and there is no way to change the number of workers on the machine throughout the life of the machine, likely future trends in labour costs will be important in the decision of whether to buy the machine. However, if the machine can be adapted easily to work with different numbers of workers (or if it is rented), only current wages will affect the decision.

As technologies of producing different products may differ, the same factor prices will not lead to the same factor proportions for all products. Some products such as steel and machinery may be more readily produced by a highly mechanized process, whereas others such as personal services and education have to use more labour relative to capital at the same factor prices.

It is thus clear that the aggregate level of demand for labour and capital will depend on the composition of the demand for products. If demand for services is high relative to demand for manufacturing product, the demand for labour will be higher than in the reverse case, even if the relative factor prices are the same.

A rise in the price of any factor of production—for example, labour—will have two major effects: first, it will lead the firm to choose a different combination of resources to produce any product by substituting the cheaper factors for the one which has increased in price; and second, it will raise the price of the product in line with the change in its cost. The first effect will decrease the demand for labour and increase the demand for other factors of production. The degree to which this will occur will depend on the technological characteristics of production—that is, on the degree to which other factors of production can perform some of the functions performed by labour in the production process. This characteristic of production is measured by economists by a number called the "elasticity of substitution", which is defined as the percentage change in the ratio of use of two factors of production due to a one percentage change in the ratio of the relative prices of the two factors. The easier it is to substitute one factor for another, the higher the value of the "elasticity of substitution"—and thus the greater the reduction in the demand for a factor by a firm when its prices rise. Thus we can see that when wages rise each firm has an incentive to "automate"—that is, to substitute equipment for labour. The reverse, of course, occurs when the price of machinery rises: labour tends to be substituted for machines. Evidently the first effect of a rise in the price of a factor of production is to reduce demand for that factor and increase the demand for other factors. However, the results of the second effect are not as clear. A rise in cost will cause a reduction in output. This will reduce demand for all factors of production used by the firm, including both labour and machinery. This will further reduce demand for labour in the case of an increase in wages, but will tend to offset the effect of the substitution on machinery. The demand for machinery by the firm may rise or fall depending on whether the first or second effect is stronger.

The results may change somewhat when a number of industries are taken together. A rise in wages will greatly increase costs of those industries that use a high ratio of labour to machinery and that cannot easily substitute one for the other, but will not significantly affect the costs of industries where labour represents a low proportion of total costs. The unequal effect on prices will lead to a shift in demand from labour-using to capital-using industries; this will reinforce the substitution in production and lead to a further reduction in the demand for labour and to an increase in the demand for machinery in response to a wage increase, provided total demand in the economy remains unaffected.[2]

The foregoing discussion enables us to analyze some of the influences on the determination of demand for the different factors of production by an individual firm or by a group of industries at any point in time. We are now in a position to look at changes in the underlying conditions over time. These include, on the one hand, changes in the conditions of production—that is, technological progress—and, on the other hand, changes in the patterns of demand for commodities, with changes in tastes and incomes. We shall concentrate on the first, but we must remember that the effects of changes in the composition of demand are just as important and may not operate in the same direction as the changes in technology.

Technological change may take many forms: the invention of a new product, the invention of a more efficient machine, an improvement in the production process and so on. Some of these may involve substantial capital investment; others, only relatively minor changes in organization and operations. Some may involve spectacular new machines; others, seemingly minor modifications to old machines. Even though many people think that technical progress is primarily represented by or embodied in new and different machines, rather than in organizational and other minor improvements, there is some evidence to suggest that the major part of the improvement in productivity per worker is due to these seemingly minor improvements and is not necessarily a result of major capital expenditure.[3]

Be that as it may, a common characteristic of most processes which we call technical progress is that they enable the firm to produce the same output with less resources (or more output with the same resources). Alternatively, new combinations of resources can be used to produce a given item. Thus the essence of the process is that the bag of techniques available to produce any product keeps changing. These efficiency changes do not affect all combinations alike. Some combinations become more efficient than others, so that at any set of factor prices a new combination of resources may be chosen over an old one. The effect on the demand for any one factor cannot be determined without reference to the specific nature of the innovation. The only generalization one can make is that at current market prices the value of the resources going into the production of one unit of output will be less than that of the resources used before the innovation. In other words, the innovation must reduce costs, or it will not be adopted.[4]

The effect of an innovation in any industry on the demand for individual factors of production cannot be determined by *a priori* reasoning. The new technique chosen may use more or less of any one factor to produce a given output, depending on the nature of the innovation. In addition the reduction in production costs, if translated into lower prices, will involve increases in volume of production which will increase the demand for most or all factors of production. Thus, if the demand for the product is price elastic,[5] it is even possible for the demand for all factors of production in this industry to go up.

Economists therefore distinguish between types of technical progress according to their effect on the demand for different factors of production for *a given level of output.*[6] An innovation is called neutral if it reduces factor requirements in such a way that the optimal mix of factors necessary to produce the current level of output remains unchanged. An innovation which reduces labour requirements by more than capital requirements is called labour saving; if it reduces capital requirements by more than labour requirements, it is called capital saving. These specifications refer only to the optimal or preferred combinations at the same level of output and factor prices; thus the non-optimal combinations available are disregarded.

An example will help clarify these concepts. Suppose ten man-hours on a $1,000 machine were the optimal combination to produce a gidget before the innovation. After the innovation the following combinations can produce one gidget: (*a*) 5 man-hours and a $1,000 machine; (*b*) 10 man-hours and a $500 machine; (*c*) 7 man-hours and a $700 machine.

The innovation will be called neutral if combination (*c*) is cheapest; labour saving if combination (*a*) is cheapest; and capital saving if combination (*b*) is cheapest, given no change in the initial prices for machinery and labour. It is interesting also to point out that, as the example shows, the factor for which the demand suffers most shows the largest increase in average productivity.[7] Thus an average productivity increase is not necessarily related to increases in the demand for a factor, and the common argument tying wage increases to improvements in the average productivity of labour in a given firm or industry is shown to be wrong. In this case, if (*a*) were the best combination, a wage increase might lead to a further decrease in employment.

As pointed out before, a labour saving innovation does not necessarily reduce the demand for labour in this industry, for changes in output may increase demand for labour sufficiently to compensate for the factor substitution in favour of more capital. The effect is rather to decrease the demand for labour *relative* to the demand for capital *in this industry*. By the same token a neutral or capital saving innovation might lead to a reduction in the demand for labour in the industry, if the demand for the industry's product is sufficiently price inelastic.

It can be shown that under most conditions, unless an innovation is highly capital saving, an isolated innovation in a given industry is likely to lead to reduction in the demand for labour in this industry. This is because the change in the cost (and therefore in the price) of the final product due to any given innovation is likely to be very small relative to the effect on labour requirements; thus the effect of the increase in production is likely to be minimal relative to the direct decrease in labour requirements. The same argument, however, applies also to capital: unless the innovation is highly labour saving, the demand for capital is also likely to fall.

The direct effects of an innovation appear, then, to be a reduction in the demand for most factors within the innovating industry. This at least partly tends to confirm the view that technical change is labour displacing. And indeed, from the point of view of the displaced worker, the innovation appears most unwelcome.

However, these are only the direct effects. When the indirect effects are taken into consideration, the picture is likely to change radically.[8] For the reduction in the demand for labour in one industry may be offset by increases in the demand for labour producing raw materials for this industry. It is difficult to prove the point here, but an example may illustrate the process.

Suppose a highly labour saving innovation is adopted in automobile assembly which enables the firm to use 50 per cent less labour with an unchanged amount of capital. If we assume that labour and capital accounted for 50 per cent each of assembly costs, this change will reduce assembly costs by 25 per cent. If we assume that assembly costs constituted 20 per cent of total automobile costs prior to the innovation, this innovation will then reduce automobile costs by 5 per cent. If this cost reduction is passed on to consumers and if the elasticity of demand for automobiles is 2, auto production and sales will rise by 10 per cent. Thus the effect on the demand for labour in assembly will be a reduction in the order of 45 per cent, composed of an initial reduction of 50 per cent due to the innovation and an increase of 5 per cent due to the increase in sales. However, the 10 per cent increase in sales will increase by 10 per cent the demand for both labour and capital in all pre-assembly levels of automobile production. As we assumed that 80 per cent of automobile costs are accounted for by pre-assembly costs in which labour is employed in the same proportion as the pre-innovation assembly process (that is, 50 per cent each), then the 10 per cent increase in their labour demand will almost offset the decrease in labour demand in assembly. The net result will be a reduction of 1 per cent only in total labour demand.

Thus, even though from the point of view of the displaced assembly worker automation has deprived him of a job, from the point of view of all workers in the various industries involved this is not the case.[9] Evidently, from the point of view of the labour unions concerned, the analysis and discussion of automation must be performed both vertically and horizontally on the widest industry classification—so as not to block technical progress because of costs imposed on a small group. If in our example the union embraced only assembly workers, it might wish to block adoption of the innovation. But if it embraced all automobile workers—the problem being reduced to one of organizing the movement of labour from assembly to other processes of automobile production—the union would have no reason to block innovation. It is important to note that the analysis is not applicable to special types of labour. If the initial effect of the innovation were to displace a particular kind of skill, then the increase in general labour demand due to secondary effect may not result in an increase in the demand for this particular skill. Thus, although an innovation is not likely to make all *people* obsolete, it may very well make certain *skills* obsolete. Craft labour unions recognize this and have therefore been very conservative in accepting skill displacing innovations. The problems arising in such situations are not easily soluble, for they involve retraining as well as change of employer or process. Unfortunately, the amount of information on the extent and severity of such dislocations of skills is almost nil. All one can show here is that the problem *may* be serious and is unlikely to be offset by market forces without severe loss to the workers involved.

The preceding analysis has dealt with the effects of technological change on labour demand at the level of an individual industry or of a small group of related industries. The results, however, do not always hold for the economy as a whole. This becomes clear as soon as we realize that machines are not *primary* factors of production but rather are produced by means of labour and other machines. Thus a change in the demand for machines creates a change in the demand for labour in the machine production industry. Even if the initial innovation in a given industry were labour saving in this industry, it may lead to an increase in the demand for labour in the machine producing industry, which will partly offset the decrease in demand for labour in the industry where the innovation has taken place. The exact nature of such interactions between capital producing and consumption goods producing industries is not clearly understood yet, and is currently subject to much debate and research. But under some simple assumptions it is possible to demonstrate the effects of technical progress on the total economy.

If we look at the economy as a whole, ignoring relative changes among industries, we can see that if innovations are occurring in all industries simultaneously at about the same rate there will be no change in relative prices due to technical progress; for all industries will either maintain their prices, passing the increased efficiency to the factors of production, or lower their prices by approximately the same amount. In either case the real income of all consumers or all producers will rise by the same proportion as the average increase in productivity. Thus the total demand for output of consumer goods will depend on the *income* elasticity of demand for consumer goods

—that is, on the marginal propensity to consume—which in the long run appears to be about .9, not quite enough to generate sufficient demand to absorb all increases in output. Investment will have to take the slack in order to increase demand by the same amount as the increase in supply.

It is clear that as far as the whole economy is concerned, if technical progress is neutral, the question of unemployment due to technical progress is simply a question of maintenance of a sufficiently high rate of growth of total demand. If the rate of growth of investment is not enough to take the slack, expansionary government policy must insure a sufficient growth of demand.

However, if technical progress is not neutral, then maintenance of a high rate of growth in demand is not sufficient to prevent unemployment. Adjustments in the relative prices of labour and capital must occur to ensure full employment. To explain this, let us return to our example (pp. 126-127): before the innovation, 10 man-hours on 10 machines was the optimal combination to produce 100 gidgets. After a labour saving innovation, only 5 man-hours and 10 machines is the optimal combination, given no change in factor prices. If the economy contains only these 10 man-hours and 10 machines, some unemployment will initially arise (that is, only 5 man-hours and 10 machines will be employed). If the stock of machinery could be doubled, the economy could handle its production and employ all workers. Income of workers and machine owners will have increased by the same proportion. However, the increase in the quantity of capital may not be possible or profitable. At the extreme we can envisage a situation where the stock of capital remains unchanged. In this case 5 man-hours will remain unemployed and exert a downward pressure on wages. Only if wages fall relative to cost of machines will additional labour be hired. The fall in wages is relative, not necessarily absolute, as the initial effect of the innovation was to raise total productivity and thus to raise both wages and returns to machine owners. The magnitude of the fall in wages depends on the elasticity of substitution between labour and capital. The lower the elasticity, the more difficult the substitution and therefore the larger the relative wage cut necessary to restore full employment.

This example, then, demonstrates that the question of the nature of technical progress is one of *income distribution* rather than of employment. Labour saving technical progress causes a reduction in wages relative to the return on capital, unless the capital stock increases sufficiently fast to offset this. Thus the problem of automation is misspecified. Automation may cause unemployment at the going wage rates *if* capital is *not* accumulated fast enough. Or, alternatively, continuing high employment at rising wages is consistent with increases in the capital labour ratio (that is, with "automation"). In order to raise wages quickly it is necessary to replace labour by capital. Unemployment at acceptable wage rates will occur only if capital is not accumulated at a sufficiently high rate.

The statistical results[10] for Canadian manufacturing supply some of the numbers to evaluate these results quantitatively. A "production function" relating labour and capital inputs and technical progress to output for Canadian manufacturing industry was fitted for the postwar period. The study revealed that the elasticity of substitution remained approximately at 0.4 throughout the period and that labour productivity increased at a rate of about 4 per cent per year, whereas capital productivity remained about constant. Within this context this implied a rate of substitution of capital for labour of about 2 per cent per year in the absence of relative price changes. The rate of growth of capital exceeded that of labour by slightly more than this. The result has been a fairly constant pattern of income distribution between labour and capital throughout the postwar period, a constant rate of return on capital and a considerable increase in real wages. Thus the pattern of technical progress which was labour saving in the postwar period, coupled with a sufficiently high rate of accumulation of capital, enabled us to increase employment in Canadian manufacturing and at the same time substantially raise real wages.

What is the truth of the assertion about an increased rate of technical progress and automation in the postwar period? Our statistical results seem to support this casual observation: the rate of technical progress appears to be higher in the postwar period than during the prewar period. Moreover, the direction of technical change appears to have changed. During the postwar period it was labour saving, while in the prewar period it was approximately neutral. Thus proponents of the "automation" point of view appear to be right. However, it is quite clear that while their observations may be correct, their conclusions are not. The postwar period, characterized by a high rate of labour saving technical progress, gave rise to high levels of employment and increases in real wages; whereas the prewar period, with its low rate of neutral technical progress, gave rise to a low rate of increase in real wages and to considerable unemployment. This points out the importance of aggregate demand in the process of growth. In the prewar period capital accumulation took place at a very low rate due to deficiency of aggregate demand. Thus a rising level of wages was inconsistent with high and rising levels of employment. However, in the postwar period a high level of demand, and therefore of capital accumulation, made it possible for both wages and employment to grow at a high rate.

In conclusion we must stress again that the results of the process of technological progress are quite different for the individual firm, industry or union than for aggregate business or labour. Technical progress appears to be labour displacing and, due to substitution of labour by capital, causes severe repercussions for individual workers and unions. However, at the aggregate economy level it is precisely this process of capital accumulation which makes possible continued simultaneous growth of employment and wages.

NOTES AND REFERENCES

[1] In fact the contemplated output is dependent on cost, so that the procedure involves simultaneous determination of inputs and output. However, the simplified picture presented here is adequate for our purposes.

[2] This is an important qualification. We shall return to it later.

[3] See, for example, Hollander, S. *The Sources of Increased Efficiency*, Massachusetts Institute of Technology Press, Cambridge, 1965, pp. 195ff.

[4] This abstracts from innovations which improve the final product rather than from the method of production. These innovations are generally not properly accounted for in National Income and productivity calculation. Because of extreme difficulties in their valuation, as a rule they are not part of the usual measure of productivity improvement or technical progress. We shall, there-

fore, not analyze the nature and effects of these innovations in this paper.

[5] See Professor Kruger's article in this volume.

[6] Note that these effects are not necessarily the same for all levels of output. However, we are interested only in these effects in the approximate region of the current output.

[7] Average productivity is average output per unit of input.

[8] See Professor Hollander's paper for a discussion of the role the classics attributed to the service sector in absorbing labour displaced from the manufacturing sector as a result of technical change.

[9] The total effect depends, of course, on the elasticity of demand for the product and on the labour intensity of industries supplying raw materials. However, it can be seen that in any case the net final impact is considerably smaller than the immediate impact on workers directly affected.

[10] See Kotowitz, Y., "Production Functions in Canadian Manufacturing 1926-39 and 1947-61", Paper delivered at the Conference on Statistics in Ottawa, June 10, 1967, mimeographed. It must be pointed out that the result should be taken as indicative only, as the estimates are based on some tenuous statistical and economic assumptions.

4

Structural Unemployment

John W. L. Winder

I INTRODUCTION

The Problem of Structural Unemployment

Structural unemployment must be considered in relation to other types of unemployment. A generally accepted classification distinguishes five types: (1) frictional, (2) cyclical, (3) seasonal, (4) technological and (5) structural. Briefly, these terms have been used to refer respectively to unemployment arising from (1) "the necessarily imperfect operation of the labour market", (2) "the business cycle", (3) "climate", (4) "changes in methods of production" and (5) "the failure of the economy to adjust at a sufficient rate to changing circumstances".[1]

The basis for an ideal classification is by no means obvious. For example, structural unemployment might be considered to include technological unemployment. It might also be treated as a variant of frictional unemployment. Careful consideration must be given to this matter of definition or classification in order to understand the structural unemployment debate of recent years.

At the core of that debate has been the conceptual problem of whether or not structural unemployment must be distinguished from cyclical unemployment (with respect to causes, or cures, or both) and, if so, whether or not the problem of structural unemployment is important, or at least rapidly increasing in importance.

At first sight it seems easier to get around the problem of defining structural unemployment by saying what it is not. It is said that structural unemployment is not cyclical or, in other words, is not the result of inadequate aggregate demand. The relationship between aggregate demand and the level of employ-

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ment has, since the publication in 1936 of Keynes' *General Theory*, come to be generally understood. It is said that expansion of aggregate demand, the Keynesian prescription to eliminate unemployment, would not get rid of structural unemployment, or at least would not do so without excessively high rates of price and wage inflation. The proviso with respect to inflation is critical to the issue and it points to a relationship which has come to be as important in our thinking as the relationship between employment and aggregate demand in Keynesian theory. This second relationship, the trade-off between the objectives of full employment and price stability, is portrayed in the form of a curve which relates the level of aggregate unemployment to the rate of change of prices. This in turn directs attention toward the role of prices as a rationing or allocating mechanism in the economy. The problem of clarifying the concept of structural unemployment is closely tied to this role of prices.

From the policy point of view it is obviously of great importance if such objectives as price stability and full employment have to be regarded as alternatives to be balanced one against the other in the achievement of an optimal policy mix, rather than as independent objectives simultaneously and completely attainable. From the point of view of this chapter, the question is the extent to which the existence or the degree of such conflict between policy objectives may be related to structural unemployment.

In brief, then, a discussion of structural unemployment must begin by stating what the term has been intended to represent; and at the very least this requires that structural unemployment be considered in relation to other categories of unemployment. Furthermore, a basic understanding is necessary of the allocative role of prices and of the processes of the business cycle insofar as they affect employment. Within this framework it becomes possible to identify the important questions and seek the answers upon which constructive policy depends. The remainder of this introduction is an elaboration of the nature of this framework.

Framework of the Chapter

Possible Sources of Structural Unemployment

A list of some of the specific factors which have been suggested from time to time as causes of structural unemployment is useful in beginning the discussion. Factors such as withdrawal of government defence contracts, a greater willingness to import, a loss in control over industrial development because of increased reliance on foreign capital and the possibly associated accumulation of errors of past investment decisions are all related to the composition or the mix of aggregate demand. Factors such as insufficient or inappropriate education, the influence of changing technology in the creation of labour saving inventions and the accelerated adoption of automation, changes in industrial location and the depletion of natural resources are all related to the composition or the mix of aggregate supply. It is in a sense the lack of correspondence between the mix of aggregate demand and the mix of aggregate supply which, as the proponents of the structuralist view of unemployment see it, gives rise to the problem. The problem is similar to that of trying to fit square pegs in round holes: the pattern of demand for goods does not imply a pattern of demand for resources, labour and capital which corresponds to the pattern or distribution in which such inputs are available. Since it is the role of the price system, for the most part, in our type of economy, to bring about correspondence between the independent responses of buyers and sellers, acceptance of the structuralist theory implies that the price system for some reason or set of reasons has become less efficient as a mechanism for the organization of economic activity.

The Role of the Price System

Consideration of the problem of structural unemployment therefore requires an understanding of the role of the price system and an examination of its probable performance in various situations. Introductory discussions of economics usually stress three prime aspects of the organizing role performed by prices.[2] Prices largely determine (1) what to produce, (2) how to produce and (3) for whom to produce. These are interrelated questions but it is convenient to consider each separately.[3] Prices help to determine what to produce in the sense that consumers use dollars as ballots to vote for or bid for the goods and services which they most desire. Prices help to determine how to produce because they guide businessmen in the efficient or economical use of resources, labour and capital and in the determination of the extent to which particular lines of endeavour should be carried on in the pursuit of greatest profit. Prices help to determine for whom to produce in the sense that the prices which individuals receive for their own contributions to production, their rates of earnings and the rates of return on the land, resources and capital which they own help to determine the number of dollar ballots individuals may command. Prices also serve a shorter-run objective in the rationing of fixed supplies and a longer-run objective in the determination of the extent to which current production will be devoted to the generation of investment goods, the building up of the stock of physical capital, rather than to the satisfaction of demand for goods and services for current consumption. A perfectly functioning price system would perform all these tasks efficiently, and the mismatching which is the core of the problem of structural unemployment would not arise. Much of the literature reviewed here, therefore, relates to possible reasons for deterioration in the performance of the price system and/or to possible sources of increased burden upon a system of given efficiency.

The Role of Aggregate Demand

It is not only necessary to enquire into possible causes of structural unemployment; indeed, it is more directly important to ascertain whether or not the appearance of structural unemployment is mere illusion. That is, it is important to establish whether or not an alternative explanation of actual unemployment might be the valid one. This is obviously not simply a matter of academic interest. The policy implications of the distinction are clear-cut.

Recent support for policies designed to influence the operation of the labour market has been predicated on the view that certain persistent pockets of unemployment cannot be effectively dealt with by stimulation of aggregate demand. This proposition invites a review of the determinants of the aggregate level of employment and an examination of actual experience. It is of course only in the postwar period that there has come to be general acceptance of the theory of employment and public policy related to full employment.[4] It is now widely understood that we can moderate cyclical fluctuations in unemployment and avoid the disaster of mass unemployment by appropriate regulation of aggregate demand. The linkage is simple enough, once understood. The greater the output of the economy, the greater the employment of resources in general and labour in particular in any short-run situation in which capital and the level of technology are essentially fixed. The output of the economy, until resources are fully employed, will increase in response to the demand for it. Thus the determinants of the level of aggregate employment are traced to the determinants of the various components of aggregate demand: consumer spending, business investment, government spending and exports net of imports. Classical economists were unable to trace this aggregative relationship because of their confidence in the ability of price and wage flexibility to ensure that full employment would automatically be attained.[5] By assuming inflexible wages, Keynes demonstrated that a private enterprise economy places the burden of maintaining full employment on the government. As may be appropriate from time to time, the government may alter its spending and influence the spending of others through a variety of fiscal and monetary devices in such a way as to establish that level of aggregate demand required for full employment.

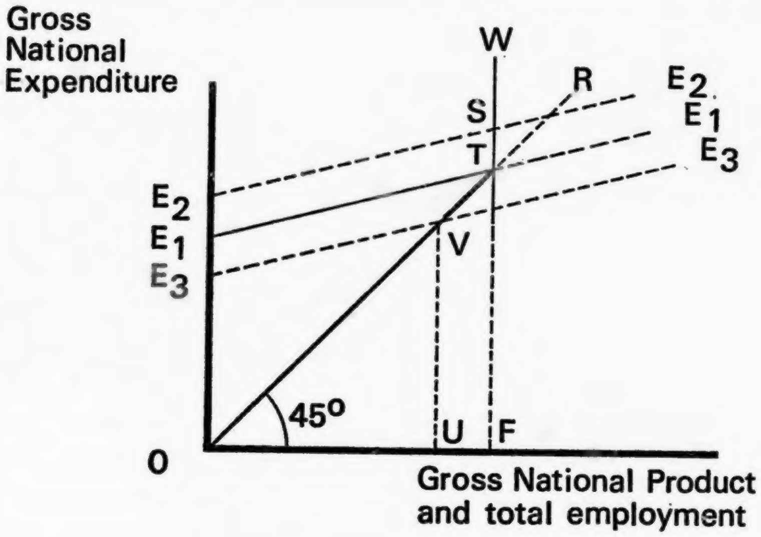

Figure 4-1

Figure 4-1 illustrates the relationships outlined in the preceding paragraph. In the vertical direction is measured Gross National Expenditure, the value of newly produced goods and services comprising aggregate final demand during a period of time. The expenditure side of every such transaction has its opposite in the receipt of income by a factor of production and the aggregate of these income payments over the same period of time constitutes Gross National Product for the period. As a matter of double entry bookkeeping, then, a balance of the National Accounts requires equality between Income and Expenditure. This inevitable equality arising from the nature of accounting is represented in the diagram by the line *OR*, which has a 45° slope. Any point on *OR* represents a value for Gross National Expenditure equal to the value of Gross National Product.

The lines *E*1, *E*2 and *E*3 describe, for alternative circumstances, the typical way in which aggregate spending plans in the economy tend to be influenced by the level of economic activity. Any one of these lines shows a tendency for planned expenditure to increase with an increase in income: a movement to the right in the diagram (an increase in Gross National Product and total employment) involves an increase in the height of a particular line, such as *E*1. In a given set of circumstances, a particular level of planned expenditure will correspond to a particular level of national production. For example, given the circumstances for which line *E*1 is drawn, the level of planned expenditure is *TF* when the level of national production is *OF*. Different points on *E*1 would correspond to different levels of Gross National Product. The point *T* is used in the illustration for simplicity; it is of special interest because it marks the intersection of *E*1 with *OR*. For the sake of further simplicity in exposition, it can be assumed that the corresponding level of national production, *OF*, represents "full" employment.

The intersection of an expenditure line with the *OR* line indicates that the plans are necessarily circumscribed by what is feasible. If plans call for expenditure in excess of national production, the discrepancy between desired production and actual production must somehow be reconciled. Planned expenditure exceeds national production to the left of the intersection of an expenditure line with the *OR* line. The reconciliation takes either of two forms. Until full employment is reached, national production and employment increase in response to this upward pressure of demand.[6] This response cannot continue beyond the point of full employment, and any residual excess of planned expenditure must spill over into increased prices of the limited flow of goods and services actually forthcoming. The point of full employment therefore represents a boundary between price stability and inflation. In particular, the point *T* represents the ideal point of balance, full employment and yet price stability.

Before modifying this description to bring it more closely into line with the actual alternatives of the real world, the implications of the alternative expenditure lines *E*2 and *E*3 should be understood. Compared with *E*1, levels of planned expenditure are higher on *E*2 and lower on *E*3 for corresponding levels of national production. A wide variety of circumstances give rise to such changes. The move from *E*1 to *E*2 can be analyzed in terms of the various categories of expenditure for which plans may have been revised upward. Essentially, these categories are expenditure by consumers, by investors in capital goods, by government and by foreign purchasers of our exports. Expenditures on imports work in the opposite direction and therefore act as an offsetting factor. The level of an expenditure line can readily be influenced by public policy. An increase in the line can be brought about by the encouragement of consumer spending through relief from personal taxation, by similar encouragement to capital investment perhaps reinforced by easier monetary policy and lower interest rates, and most directly of all, by an increase in government expenditure. That is to say, the traditional tools of fiscal and monetary policy are designed to influence the level of economic activity through the management of aggregate demand. In Figure 4-1 change in aggregate demand is illustrated by the level of the *E* line, and the intersection of the *E* line with the *OR* line traces out the associated influence on the level of economic activity.

The level of aggregate demand implied by the line *E*3 is inadequate to generate full employment. The level of national product or employment that would result is represented by *OU* and this falls short of *OF* by *UF*. Therefore *UF* is a measure of cyclical unemployment or deficient-demand unemployment. The analytical issue in the debate about structural unemployment is to distinguish it from deficient-demand unemployment—that is, to determine the true cause of actual unemployment. If unemployment is simply due to deficient aggregate demand, the policy prescription is clear. The deficiency in aggregate demand should be eliminated through some combination of policies along the lines indicated above. If these policies fail, the structuralist case is to some extent established.

The Role of the General Price Level[7]

The issue is further complicated, however, by certain important relationships in the real economy not represented in Figure 4-1. Passing mention was made above to the need for modification of the diagram in the light of these relationships, which have to do with the onset of inflation. In Figure 4-1 no inflation develops until full employment is reached. Production and employment then bump against the full employment barrier represented by *TW*, and the gap between planned expenditure and actual production cannot be closed by increasing production. The size of this "inflationary gap" is *ST* when the planned expenditure line is *E*2. As long as such a gap remains, prices must rise. In the real economy, of course, inflationary pressure does not suddenly develop at some uniquely defined full employment level of output. As unemployment disappears below a certain level, frictions (if not outright bottlenecks) tend to develop in various sectors of the economy and accordingly prices tend to rise. The rise in prices in such cases is in conformity with the role of prices in the organization of economic activity as already outlined. If, as seems to be the case, prices on balance are "sticky" downward, declining less readily than they rise, then the organizing function of the price system (which requires some prices to rise relative to others) will almost necessarily involve an increase in the average level of prices—that is, inflation.

Implications for Policy

The higher the level to which the employment rate is pushed, at least in the short run, the higher, probably, the rate of inflation required. In other words, this combination of relationships gives rise to a situation in the real economy such that there is created a range of alternatives involving a trade-off between two independently desirable objectives of public policy, the objective of full employment and the objective of price stability. A greater realization of the former is to be had only at the cost of some sacrifice in the attainment of the latter.

This range of feasible alternatives is called the trade-off curve. It differs from the so-called Phillips curve only in that the rate of change of prices rather than wage rates is related to the unemployment rate.[8] This is a widely acknowledged example of the sort of conflict which may arise among alternative objectives of policy in a modern economy. Careful studies relating to such conflicts have recently been carried out for the Economic Council of Canada.[9]

These policy implications of the trade-off exist whether or not there is structural unemployment (although structural unemployment may aggravate the problem). The central policy question relating to structural unemployment derives from the distinction between structural unemployment and cyclical unemployment. The policy tools (influencing aggregate demand) designed to cope with cyclical unemployment are not suitable for dealing with structural unemployment. It is therefore important to know whether or not significant structural unemployment exists and, if so, what can be done about it.

Summary and Outline

This introductory discussion has demonstrated that structural unemployment must be considered in relation to other types of unemployment, and in particular that this requires an understanding of cyclical or deficient-demand unemployment. The problem of definitions is a difficult one and the difficulties are considered in section II. The preliminary definition of structural unemployment given in this introduction is, however, a useful one. It points to the difference between cyclical and structural unemployment by defining the latter as that which cannot be cured by application of the fiscal and monetary remedies generally prescribed for the former. Illustrations of the sorts of circumstances said to give rise to or be indicative of structural unemployment so defined imply a preoccupation with the mismatching of the components of aggregate demand and the components of aggregate supply. This in turn directs attention toward the price system as the prime means within the free enterprise system for handling precisely such problems of the organization of production and distribution. When attention is focused on prices, however, the distinction between structural unemployment and cyclical unemployment becomes blurred. When unemployment can be removed by expansion of aggregate demand without inflation, the unemployment must surely have been cyclical and not structural. Alternatively, if expansion of aggregate demand should result only in inflation and not at all in the elimination of unemployment, the inclination is to declare that the unemployment is structural. In actual fact, of course, experience usually falls somewhere between these two extremes.

Moreover, the real source of ambiguity lies in the fact of the trade-off curve, the fact that some inflation is normally associated with rates of employment above a certain level. The definitional problem therefore emerges again, and attention is specifically directed in section II to the ways in which this problem of definitions has been handled in the literature.

Section III discusses the conflict between the policy objectives of full employment and price stability. Two immediately related considerations, the determination of aggregate price levels and the mobility of labour, are then investigated in sections IV and V respectively.

Against this background, empirical studies are reviewed in section VI. These results of measurement of various sorts have been lifted out of their theoretical settings in particular studies in order to keep the analytical development as straightforward as possible. The final section, VII, draws together some implications for policy, with special reference to the question of manpower policies.

Essentially, the concensus of economists is that structural unemployment however defined has not yet become a very important problem. The literature on the possible causes of and cures for structural unemployment is nevertheless of great value. At the very least it sharpens our understanding of the power and the limitations of the traditional tools of monetary and fiscal policy in the control of unemployment and in the pursuit of price stability. It also points the way toward labour market policies capable of permanently warding off the development of a major problem of structural unemployment and capable of improving the range of attainable objectives of traditional monetary and fiscal policy. The literature also sets forth suitable criteria for deciding upon the adoption of particular measures among these labour market policies. The purpose of this chapter is to review the relevant literature—the theoretical, the empirical and the policy-oriented—in an attempt to assess the nature, importance and implications of structural unemployment.

II CLASSIFICATION OF UNEMPLOYMENT

Classifications of unemployment may be based on either supposed causes or expected cures. Both are important. To understand what is going on it is necessary to diagnose causes. To deal with developments it is necessary to prescribe appropriate policies, or cures. It is deceptively easy to represent the standard classification from either viewpoint, as in the following table:

Type of Unemployment	Cause	Cure
(1) Seasonal	seasonality	off-seasonal employment
(2) Cyclical	deficient demand	monetary-fiscal policies
(3) Technological	changing technology	retraining
(4) Structural	adjustment lags	facilitation of mobility
(5) Frictional	market imperfection	improved labour market information

This picture is radically oversimplified in order to emphasize the distinction between bases of classification, and to emphasize the distinction between general monetary and fiscal policies on the one hand and a variety of selective manpower policies on the other. Frictional unemployment is usually considered irreducible but there may be some scope here for selective manpower policies. The simplified picture is not strictly a true one, because the lines between categories are not really clearly drawn for either basis of classification and because one type of unemployment may influence another no matter how the lines are drawn. This section of the chapter explores the complications which therefore inevitably arise.

Classification by Causes

Frictional and Technological Unemployment

Frictional and technological unemployment are conceptually distinct in that the former would exist even in the absence of technological change, although technological change itself could not result in unemployment without friction of some sort. To the extent that changing technology merely increased the absolute number of persons seeking new jobs in any given period of time, unemployment would increase for any given degree of friction (the degree measured, say, by the average duration of such unemployment) relating to the movement of workers among jobs. It would be difficult to decide whether this should be regarded as technological unemployment, or simply as an increase in frictional unemployment which might alternatively have arisen from a change in any one or more of a number of factors influencing the rates of hiring, firing, job quitting and job seeking, in an efficient labour market at full employment. There is a presumption, however, that there is more to technological change than this. According to this view, technological change (of which automation may be a particularly dramatic manifestation) tends to eliminate categories of employment altogether while admittedly creating new ones at the same time. Two aspects of these changes are of immediate interest: (1) will the net impact alter the aggregate demand for labour, and (2) even if not, will the demand for and supply of labour not be so mismatched as to increase the degree of friction on account of the necessity for retraining between jobs? The first question constitutes no new difficulty so long as we continue to ignore the possibility of conflict with other policy goals such as price stability; for the Keynesian prescription of increased aggregate demand could easily compensate for any reduction in the demand for labour, thereby ensuring full employment. If the answer to the second question is "Yes", then the target value for full employment is necessarily lowered because of the increase in the minimum amount of unemployment. Whether this increment in the irreducible minimum merits the designation of technological unemployment or is best regarded as an increase in frictional unemployment is still not clear-cut. There is no difference in principle between this effect of changing technology and that of any one or more of any number of other factors influencing the degree of friction or the average duration of unemployment in an efficiently functioning labour market at full employment. An illustration would be reduced mobility in the sense of a lower propensity of unemployed workers to accept new jobs requiring change in location, skill or wage level.[10] The only reason for singling out technological change would have to be that it was especially important in some sense or other, perhaps in the relative magnitude of its impact on the level of the irreducible minimum of unemployment or in the variability of impact, or particularly responsive to such medication as selective manpower policies.

The point is that even in this simple situation problems of definition are demonstrably difficult.

What is Meant by "Structural"?

Within the above framework, simplified by the assumption of independence among aggregative policy goals, is there any room for an additional category of structural unemployment? The answer is bound to depend upon what is meant by "structural". In one sense everything is structural in that relationships being structured as they are, things are bound to be as they are. As a truism this is not very useful. It is necessary to evaluate the structure as it is in relation to what it might be. In particular, if the labour market—contrary to the assumption made above—should fail to function efficiently as an allocative mechanism, the ensuing increase in unemployment might reasonably be classified as "structural". This of course begs the question, for the moment at least, of what is meant by efficiency in the labour market; but the same question was begged earlier when it was assumed that efficiency was consistent with frictional or technological unemployment.

Inefficiency in the labour market is primarily a function of sluggishness or rigidity in the downward movement of wages. (Inefficiency can also arise from sluggishness in the response of the workers arising from slow spread or assimilation of information on opportunities. Failure to respond to known opportunities which is a matter of deliberate decision does not constitute inefficiency.) Since Keynes assumed such inflexibility, it might be said that his analysis is based on the fact of a structural defect and that so-called deficient-demand unemployment is really structural in the above sense. To the extent that aggregate demand is self-generated it depends on structure, and so unemployment attributable to deficient aggregate demand might be considered structural in origin but would not require any change in structure but just an independent increase in aggregate demand. Much anti-Keynesian analysis is consistent with this interpretation. In general, any model so constructed as to imply unemployment equilibrium might reasonably be said to give rise to structural unemployment. Any model so constructed as to permit unemployment disequilibrium but not unemployment equilibrium must rely on the specification of structural lags as the source of unemployment. There is no easy way out of this definitional morass, and the difficulties are only compounded when we admit the possibility of competing goals of aggregative policy, particularly price stability.

Structural Unemployment as Mismatching[11]

At times, the term "structural" appears to be used in a purely descriptive sense. This is the case when it is used to refer to the mismatching of unemployed men and unfilled jobs. A more sophisticated form of this view looks for a rough balance between the number of men unemployed and the number of unfilled jobs as presumptive evidence that aggregate demand is not inadequate.[12] The basis of classification then becomes that of cures rather than causes—that is, selective manpower policies are implicitly required. But the matter cannot end there, because by the very selectivity of such policies it is impossible to know exactly what to do without discovering the cause of the unemployment. This is why the concept of mismatching remains essentially descriptive and is not particularly helpful. Moreover, part of the mismatching may represent seasonal, frictional or technological unemployment. The definitional problem is not avoided at all. The mismatching label is eye-catching for those anxious to get started on the job of whittling down square pegs to fit round holes. This approach may not be so much policy-oriented as policy-vulnerable. The danger is that resources may be diverted from the more basic task of preventing the development of mismatching in the first place. The whole area of relative price and wage flexibility and general price and wage levels is left out of consideration. Moreover, the question of whether or not the level of aggregate demand really is appropriate remains as an albatross, the repository of all the conceptual difficulties apparently eluded. There is, in fairness, something in the view that structural unemployment involves mismatching. But there is not nearly enough in it to make it the basis of a clear definition of structural unemployment.

Rigidity in Production Relationships

An analysis of structural unemployment which could not be adequately explained by prevailing Keynesian theory was developed by Fukuoka, who believed it had relevance "everywhere except in the most developed industrial nations".[13] He had in mind countries in which capital was short relative to an abundant labour force, so that unemployment would result from a lack of material to work with. It would therefore be possible for a considerable volume of unemployment to coexist with inflationary pressure. In effect, he reverts to the classical economists prior to the 1890's who assumed fixed technical coefficients of production, fixed amounts of all inputs per unit of output.[14] Moreover, in a review of the literature he gains support from such eminent sources as Joan Robinson, Kaldor and even Keynes himself. The implication of this sort of model seems to be that if technological change, perhaps automation, should radically lower the labour to capital ratio in production, then unemployment of labour would necessarily result until the stock of capital had been sufficiently built up. It is not clear whether or not inflation in the interim would serve any positive role—whether it would stimulate the expansion of capital by ensuring that aggregative demand would be sufficient to absorb the output which would be forthcoming from such expansion.

The model has typically been applied to underdeveloped countries and to those damaged by wars, but it seems that developed countries might also encounter a capital shortage in the same sense if technological change should be particularly labour-saving over any short period of time. It is not just unevenness in the availabilities of factors, however, but rigidity in the mechanism of substitution among factors (in the extreme, fixed technical coefficients) which accounts for the failure of the Keynesian remedy. Empirical studies measuring the elasticity of substitution[15] between capital and labour are therefore of the utmost relevance in this connection. These need not be considered here because Professor Kotowitz' paper deals with this subject. The lower the elasticity of substitution, the more relevant is Fukuoka's model, which differs not only from the Keynesian model but from the classical model in this respect, for there is nothing to be gained from flexibility in relative prices. Keynesian policy is held to have done its job when at least one factor is fully employed. In this respect, Fukuoka's structural unemployment is conceptually identical with Gordon's.[16] Although Gordon did not specifically refer to fixed coefficients, he treated the pattern of unemployment rate differentials as technologically given and this amounts to virtually the same thing. In the type of model which Fukuoka constructs, full employment of all factors may or may not be *technologically* possible and even if so will require a particular *mix* of final demand (not just level) for attainment. In the final analysis, therefore, unemployment might remain just because people do not prefer the things which require all the available amounts of factors (at prevailing prices which are inflexible downward).

Maximization of social welfare might *require* unemployment in this sense, but it should be noted that the role of unemployment as such has been omitted from the social welfare function with respect to which this statement is made.[17] If the unemployed factor matters from the point of view of welfare, a way out may be sought through international trade or other means of increasing the scarcest factors. The surplus factor may, alternatively, be exported. The remedy for unemployment of the unskilled may not lie in retraining them but rather in increased training of new entrants or increased immigration of skilled; the relative proportion of skilled will thus be increased, permitting the expansion without inflation which is required to soak up the pool of unemployed unskilled workers. Importation of scarce resources other than skilled labour may be required. It should be pointed out, however, that the elimination of unemployment and the avoidance of inflation may be achieved at the cost of a slower rate of economic growth measured in terms of per capita real income. Fukuoka suggests that, when full employment is technologically impossible, attempts be made to change technology or the availability of factors. It would be at least as promising to enquire into the role of factor prices in inducing innovations (and thereby altering the allegedly fixed coefficients over time) and in expanding the resource base as well. There will ordinarily be a range of feasible alternatives from which the best may be selected. Too often the option of price change and response to it is rejected out of hand. There are numerous illustrations of this. Whenever there is talk of shortage or of surplus, the relevant question should be asked: "At what price?"

Localized Causes

Professor Samuelson finds the notion that some forms of unemployment fail to respond to short run variations in effective demand essentially correct but innocuous.[18] He likes to use the term "structurally unemployed" to refer to people in chronically distressed areas and people whose skills are no longer in demand, which could correspond respectively to frictional (as conditioned by labour immobility) and technological unemployment as defined above. Skills could also become obsolete because of changes in final demand. In his view the important thing is that even if structural unemployment as he defines it were zero, there would still be a tendency for wages and prices to rise for cost-push reasons even before full employment. The trade-off between full employment and price stability may be made more difficult by structural unemployment but would exist without it.

Most of these ideas are brought together in the work of Professor Harold Demsetz.[19] He infers that the discussants have been concerned with "unemployment that is distinguished by its persistence in the face of monetary and fiscal measures designed to reduce unemployment", and identifies four sources of unemployment as possibly relevant: (1) chronically distressed industries, (2) industries hit by sharp, non-cyclical loss of demand, (3) technological change and (4) a rapid secular increase in the supply of substitutable labour (for example, female, youth and non-white). The common characteristic of all four, he suggests, is that initial unemployment is not attributable to a cyclical downturn in aggregate demand.

Classification by Cures

Concept of the "Hard Core"

Professor R. A. Gordon speaks of the hard core of frictional and structural unemployment which is resistant to further expansion in aggregate demand.[20] This is an illustration of a policy-oriented definition which implies nothing about cause but at least eliminates one possible cure. In relation to the classification above, it would logically subsume seasonal and technological as well, of course. After arguing for disaggregation of the full employment goal and the establishment of mutually consistent targets multidimensional with respect to classification (age, sex, colour, occupation, education, industry of last employment and so on), he offers a definition of aggregative full employment which is policy-oriented in another sense, namely that of taking account of alternative aggregative policy goals.

> Let us define "aggregative full employment" as the percentage of the total labour force employed when, given existing

> structural-frictional reasons for differential unemployment rates, the unemployment rate for the most favoured group ceases to fall in response to an expansion of aggregate demand and the higher rates can be made to fall further only with an unacceptable rise in prices.

This approach may be thought of as policy-oriented in a third sense, in that it raises the question of the ways in which the differentials in unemployment rates may be reduced and the costs and returns of doing so. The same thing could be said of the approach which begins with the observed mismatching of men and jobs and leads to a consideration of the ways in which matches may be made and the costs and returns of match-making.

The Trade-Off

The concept of the hard core of unemployment, as evidenced in part by the unusually long duration of their unemployment, has also been a key element in the analysis of Berman[21] and Simler.[22] Berman defines structural unemployment as

> . . . that part of unemployment which should be eliminated through labor market policies, except for that amount which could be eliminated by general demand-stimulation measures unaccompanied by other measures.

Berman adds to this concept of the hard core recognition of inflationary side-effects of general demand-stimulation. The trade-off between employment and price stability is thus brought into the analysis. Aggregate demand should be pushed only to the point where there emerges a "serious bottleneck" in the demand for labour as evidenced by "a heightening of inflationary tendencies". Berman illustrates the situation by an example wherein skilled and unskilled labour are in limited supply in the short run. Any particular level of aggregate output would imply a certain level and mix of total employment. This resembles the situation portrayed by Fukuoka, except that the ratio of employed unskilled to skilled labour would rise rather than remain constant as output expanded, in Berman's view. At some point a bottleneck would be encountered in the form of full employment of skilled labour. Further expansion of aggregate demand *could not increase employment at all* (*until some of the unskilled had become skilled through retraining*). Not all of the unskilled would have to be retrained to permit full employment, because employment always involves skilled and unskilled in suitable combination. In this sense, Berman spoke of the "multiplier" effect of retraining on employment. Although the definition of structural unemployment is policy-oriented ("that part of unemployment which should be eliminated through labor market policies" and so on), it is reasonable to ask why demand-stimulation fails. The answer involves identifying the cause of structural unemployment. In this case the cause is lack of the skilled labour needed to work side by side with the unskilled should demand be expanded. The concept thus depends upon differentiation among types of labour and rigidity in the relative rates of unemployability of such types at any given level of total output. However, Berman specifically rejects differentiation by colour (that is, unemployment generated by discrimination against negroes, discussed by Gilman[23]) or age (the employability problems of the young have been discussed by Rees[24]) as sources of structural unemployment. Differentiation of these latter types would certainly be different, but surely the ensuing unemployment would fall under Berman's general definition as "structural".

The Optimal Trade-Off

The ultimate in the policy-oriented approach to a definition of structural unemployment is found in the work of Professor R. G. Lipsey.[25] By defining demand-deficient unemployment as "that which can be eliminated by the application of aggregative policies without engendering an unacceptable rate of inflation", he gives full play to the aggregative goal of controlling the price level. He goes on to define structural as "that part of the remainder which can be removed by labour-market adjustment policies, some of which are profitable in terms of financial costs and benefits while others commend themselves for non-pecuniary reasons". Finally, he identifies frictional unemployment as "the ultimate residual. Eliminating it is not worthwhile, therefore it is consistent with full employment." To an economist these definitions will be appealing because they stress the trade-off between the goals of full employment and price stability, and also stress the evaluation of costs and benefits of selective manpower policies. Policy makers should find them appealing for the same reasons and also because they are so obviously policy-oriented.

Gordon also introduced price (and other) considerations but preferred to treat price stability as a constraint rather than an element of the social welfare function. Fukuoka did not include either the level of employment or the level of prices in the social welfare function, and yet his model resembles Lipsey's in that a certain amount of unemployment might be socially desirable. Unlike Lipsey, Fukuoka would not describe such a situation as one of *full* employment, however. Lipsey's definitions are such that there is no reason in principle why frictional unemployment should not rise over time (or, indeed, behave in any way whatsoever). To the suggestion that people will not tolerate persistent increases in frictional unemployment the response might be "But the definitions and social welfare function tell us so!"

Unlike Fukuoka and Berman, Lipsey tends to ignore causation (for example, with little reference to imbalance among different types of labour) and this, of course, is as it should be if the full advantage of the policy-oriented approach is to be realized. There are many possible reasons why demand-stimulation might fail to eliminate unemployment or do so only while generating unacceptable rates of inflation. These have been specified by those who have taken the causation approach to definitions. They are not relevant to Lipsey's definition, but of course they are relevant to an evaluation of selective policies designed to eliminate the structural unemployment. Viewed only as policy-oriented definitions, the concepts put forward by Berman and Lipsey differ only in that Berman's fails to add the proviso about *unacceptable* rates of inflation, and the stipulation that cost-benefit analysis be applied to proposals for selective manpower policies. As Lipsey observes, classifications based on cures are highly volatile with respect to the measures of relative importance of alternative classes of unemployment.[26] Should there be a reduction in tolerance of inflation then, for any given level of total unemployment, on Lipsey's definitions, less would be demand-deficient and more would be structural or frictional. Those who believe that difficulties following 1958 were attributable to restrictive monetary policies following enhanced fears of inflation would say that unemployment was demand-deficient; but Lipsey would call the same thing structural-frictional.[27] The discrepancy could be resolved only if it could be shown that the monetary authorities' increased concern with inflation was not shared by society as a whole, for then Lipsey could also speak of the unemployment as due to inadequate demand.

Summary and Conclusion

Classifications of unemployment may be based on causes or on cures. Classifications based on causes involve specification of a wide variety of special factors which might give rise to unemployment which somehow ought to be considered in a special sense as structural. Almost inevitably, however, there is still involved in these specified causes the distinction of structural from cyclical unemployment. Implicitly, therefore, the policy aspect is also involved because the policy appropriate to cyclical unemployment (expansion of aggregate demand) is well known.

Classifications based on cures reflect a policy-oriented approach which directs attention specifically to the need for policies other than the expansion of aggregate demand. This view sometimes takes the form that demand expansion cannot help at all (to reduce the hard core). More reasonably, the view is that demand expansion cannot help without producing the side-effect of inflation. Finally, the policy-oriented approach is carried to its logical conclusion by incorporating not only the trade-off but the concept of the optimal trade-off and specifying that demand expansion cannot help without producing *unacceptable* rates of inflation.

Classifications based on cures and those based on causes will not necessarily result in the same measures of the relative importance of the various classes of unemployment. Classifications based on cures are more attractive in that they take full account of the range of policy considerations. They may lead to a more changeable division of unemployment into various categories, however, and it is not a simple matter to know what trade-off is in fact optimal.

On balance, Lipsey's definition of structural unemployment seems superior to the alternatives. It is formally elegant. It is not easy to apply, but trying to live up to its implications would be a healthy discipline for policy makers. It emphasizes the need for selective manpower or labour market policies so that nearer-to-full employment may be attained without incurring unacceptable costs either through inflation or through implementation of such policies themselves.

It will not be possible in this chapter to investigate the costs of inflation relative to the costs of unemployment or the probable processes whereby those formulating policy may arrive at an evaluation of either. However, the objective side of the trade-off picture (represented by a Phillips or trade-off curve) will be considered in section III. This side alone is of course not sufficient to determine the optimal trade-off. In order to understand how selective labour market policies might be expected to affect the trade-off between employment and price stability, it is necessary to understand the inflationary processes underlying the trade-off curve. Section IV relates to those aspects of such processes not covered in section III. Selective policies may be of various sorts but many of these relate to labour mobility which, therefore, is examined in section V. The next three sections thus represent an elaboration of basic elements relating to the concept of structural unemployment as Lipsey has formulated it.

III GENERAL ECONOMIC POLICIES AND DEMAND PULL (THE TRADE-OFF BETWEEN UNEMPLOYMENT AND INFLATION)

This section will be devoted to consideration of two relationships representing the conflict between the policy goals of full employment and wage-price stability. Although it is common to speak of either as a Phillips curve, it will be convenient to use this term to refer only to the relationship between the aggregate unemployment rate and the annual percentage rate of change of money wages. The relationship between the aggregate unemployment rate and the annual percentage rate of change of prices will be referred to as a trade-off curve.

The Phillips curve and the trade-off curve are of course related. Given the level of unemployment, the rate of price increase associated with a rate of wage increase will depend upon the rate of increase of productivity, the size of labour costs of production relative to the value of final sales, and the ability to evade higher labour costs via factor substitution. Any factor shifting the Phillips curve, such as a change in labour mobility, will, other things being equal, shift the trade-off curve in the same direction. The extent of such corresponding shifts in the trade-off curve would be modified by changes in the employment of labour relative to capital or by changes in the rate of profit. Alternatively, these latter changes could produce shifts in the trade-off curve without any impact on the Phillips curve.

The Phillips Curve

Phillips studied the relation between unemployment and the rate of change of money wage rates in the United Kingdom for the period 1861-1957.[28] His hypothesis was that we should observe in the market for labour as in any other market that when demand is high relative to supply the price may be expected to rise, the rate of rise being greater the greater the excess demand. The converse may be expected when demand is low relative to supply. The relation of demand to supply could be measured by the unemployment rate and, because wage rates resist declines, the relation could be expected to flatten out for high unemployment rates; hence the Phillips curve. Phillips suggested that a second factor which might influence the rate of change of money wages would be the rate of change of the demand for labour. For any level of the unemployment rate, it could be expected that wages would be bid up faster if conditions were improving and hence the rate of change of the unemployment rate might be expected to serve in this auxiliary role. These two factors represented "demand pull" forces. A third factor which he considered to represent the "cost push" aspect of wage adjustments was the rate of change of retail prices, insofar as cost of living adjustments might affect wage rates.

In summary, the basic Phillips curve is a relationship which singles out the unemployment rate as the prime factor determining the percentage rate of change of wages. Any other factor influencing the percentage rate of change of wages will shift the curve (that is, cause actual experience to diverge from that which would be predicted from the curve). The rate of change of the unemployment rate is such a shift factor, but it should be regarded as a refinement of the basic relationship and not as a change in structure. Phillips' third factor, the rate of change of retail prices, should be interpreted as measuring structural change. Phillips argued that this would exert a separately identifiable impact only in the event that retail prices were forced up by a rise in import prices or prices of home-produced agricultural products sufficiently rapid to offset the tendency for increasing productivity to reduce the cost of living. Changes in import prices, as an external factor, should probably be classed as structural change. The behaviour of agricultural prices which Phillips had in mind could be traced to changes in price-support programs, a clear case of structural change. Moreover, extraordinary change in the percentage rate of change of prices, given the unemployment rate, would imply a shift in what has been called the trade-off curve and may therefore reasonably be classified as structural.

Another possible structural factor which Phillips did not discuss is the responsiveness of the labour force participation rate[29] to the level of unemployment. When the unemployment rate is low, the rate of increase of wages is probably somewhat less than it would otherwise be; and when the unemployment rate is high, the rate of increase (decrease) of wages is probably somewhat greater (less) than it would otherwise be were it not for the tendency of the labour force participation rate to vary inversely with the aggregate unemployment rate. To the extent that this relationship was operative, therefore, the effect would be to turn the Phillips curve counterclockwise rather than simply shift it to the right or to the left. To the extent that this factor operated systematically over time, the influence could be ignored for it would be satisfactorily subsumed under the already estimated curve, there being no point in trying to isolate it. Separate identification could become important should it be suspected that the pattern of response of the labour force participation rate had significantly altered over time.

Phillips estimated his hypothesized relationship for the periods 1861 to 1913 and 1913 to 1948 separately and found close correspondence between the two. He concluded that the evidence did not support the popular view that the policy of forcing the price level down had failed because of increased resistance to downward movements of wage rates. Such increased resistance should have shown up as a shift in the Phillips curve relationship. This may well be the first empirical test of any element of the structuralist hypotheses and is one which is better founded than many. In addition to cost of living adjustments, Phillips thought uneven geographical distribution of employment, a national policy of wage constraint and a slow-down in the rate of adjustment of wage rates were factors which had shifted the curve upon occasion.[30]

Samuelson and Solow found essentially similar shift variables at work in United States' experience.[31] A shift during the Great Depression (money wages rose or failed to fall despite massive unemployment) was attributed to the New Deal's NRA codes or the insulation of the unemployment from the functioning labour market (that is, the emergence of structural unemployment). During the early years of World War II, cost-of-living increases, exceptionally rapid increase in demand and a bottleneck in manufacturing may have combined to produce a shift in the curve. In the forties and fifties, they noticed, the curve had drifted upward.

Samuelson and Solow set forth several factors which might account for the somewhat more favourable set of trade-offs in the United Kingdom. These of course represent factors which can be expected to shift the trade-off curve in any country: (1) more "responsible" trade union leadership (as revealed in a policy of wage restraint), (2) a less fractionated and imperfect labour market, with (3) such immobility as there exists less magnified through downward inflexibility (through trade-unionism and administered wages), (4) geographical compactness and (5) a policy of relocating industries where the structurally unemployed live.

Samuelson and Solow calculated from their United States Phillips curve that the cost of price stability would be 5 to 6 per cent of the unemployed civilian labour force. Alternatively, unemployment as low as 3 per cent would require price inflation of 4 to 5 per cent per year. These were short-run predictions, however, and the researchers regarded the longer run consequences of consistently high pressure or consistently low pressure policies as essentially unpredictable because the experiment had never been performed. Low pressure demand might act upon wage and other expectations in such a way as to force the Phillips or trade-off curve down. On the other hand, over the years a low-pressure economy might build up within itself larger and larger amounts of structural unemployment (the reverse of what happened from 1941 to 1953 as a result of strong wartime and postwar demands). Similarly, a low-pressure economy might either improve or worsen the long-run growth rate of the economy.

The Trade-off Curve

Figure 4-2 reproduces Lipsey's diagram of the structural unemployment problem.[32] The curve *RR* shows combinations of unemployment and percentage rate of change of prices which can be attained by varying the level of aggregate demand. Most writers simply refer to this relationship as a trade-off curve. If the price consideration should be treated by the policy maker as a constraint, as Gordon suggests, this would be represented by a line such as *r′C″* or *OC′*. Alternatively, following Lipsey's presentation, the concave indifference curves *I*, *I′* and so on may be taken to represent the rate at which the policy maker is prepared to trade off inflation for a reduction in unemployment in any particular situation.

Any indifference curve, say the one labelled *I′*, indicates alternative pairs of values of unemployment rate and rate of inflation which the policy maker regards as equally costly—that is, choice of a single pair of such values from among all those indicated by such a curve is a matter of indifference. In moving from right to left along such a curve, successive alternatives involve more inflation but less unemployment. The costs avoided through reduction in unemployment are just matched by the costs incurred through increased inflation, so that movement along the curve involves neither net increase nor decrease in overall costs of unemployment and inflation. A reduction in overall costs could be brought about only by selection of a pair of values of unemployment and inflation on a lower indifference curve, say *I″*. Every point on *I″* is less costly than any point on *I*. Since the costs of inflation and unemployment can ultimately be calculated only on the basis of the policy maker's estimates of society's preferences, it may alternatively be said that every point on *I″* is preferred to any point on *I*. That is, indifference curves nearer the left-hand corner of the diagram are preferable. A lower curve in this sense offers less inflation, or less unemployment, or less of both. Feasible values lie along the curve *RR*. Out of all these points the one which lies on the lowest possible indifference curve is *u*. The point *u* represents the target of policy. By expanding aggregate demand, unemployment in excess of *Os* (such as *Oa*) could be eliminated without inflation. Attempts to cut unemployment below *Os* generate price rises which must be balanced against the gain of cutting unemployment. The rate of inflation *Or* is *acceptable*, given the policy maker's preferences. Lipsey has criticized the authors of the Annual Report of the Council of Economic Advisers in 1962 for defining full employment as occurring when unacceptable rates of inflation are encountered, represented by *Ox*, and so defining all unemployment as deficient-demand unemployment.

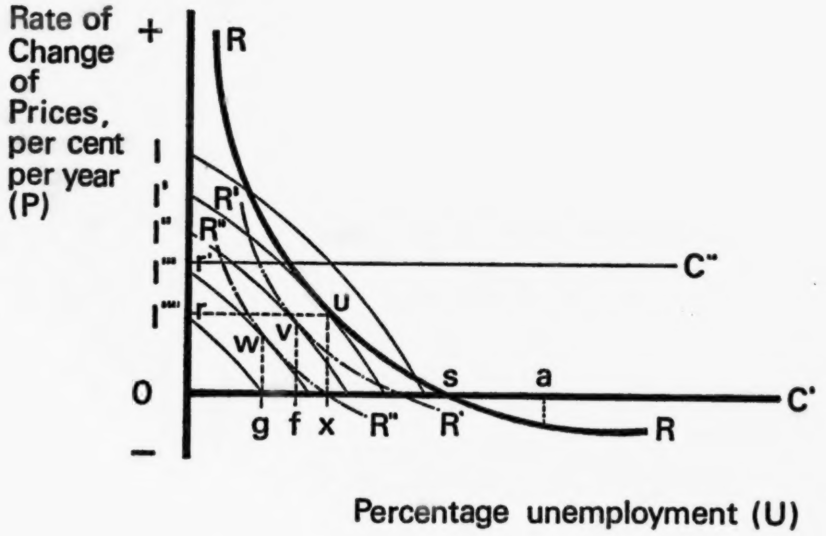

Figure 4-2

The *RR* curve is regarded as objectively determined. Historical data suggest such a range of feasible alternatives, in the same way in which historical data are used to estimate the Phillips curve. In the event that there should be any difference between the short and long-run versions of it, the *RR* curve should be thought of as relating to the long run. Reduction of the level of unemployment below *Ox* requires shifting the *RR* curve toward the origin. Without going into detail, Lipsey suggests that this movement might be effected by policy measures aimed at

> (1) reducing inequalities in excess demand (and hence in unemployment rates) between various labor markets, and (2) reducing the time taken in changing the supply of labor into the form in which it was being demanded.[33]

On standard cost-benefit analysis it might be worthwhile to shift the curve to *R′R′* and so reduce unemployment to *Of*. A further reduction of *fg* might be effected if there were social grounds to justify a further shift in the curve to *R″R″*, even though monetary cost-benefit analysis revealed that it would not pay. In summary, starting with unemployment level *Oa*, we would classify *ax* as deficient-demand unemployment, *xg* as structural, and *Og* as frictional (and consistent with full employment). The analysis may of course be generalized to include other target variables of policy. Lipsey speaks of the curves *RR* and *R′R′* as objectively determined and *R″R″* as subjectively determined, but the distinction seems strained. The decision to "live with" *RR* (do nothing by way of selective policies) or "adopt" *R′R′* (do only that which pays) seems to reflect the subjective as much as the decision to do certain things, some of which pay and some of which do not (*R″R″*). Lipsey feels the distinction between frictional and structural unemployment is not otherwise clearly defined.

> Much of what is called structural unemployment merely consists of frictional unemployment operating with an unacceptably long time-lag.[34]

It appears that Lipsey thinks of frictional unemployment as determined primarily by the length of time, on average, that a worker is between jobs. This transition time per job-changer is essentially what was referred to earlier as the degree of friction. An increase in such time would, other things being equal, certainly lead to an increase in frictional unemployment. Other things are not always equal, of course, and changes in certain factors would lead Lipsey to reclassify the extra unemployment as structural rather than frictional. A fall in the cost of reducing transition time (through retraining, for instance) would be an illustration of one such factor. Another would be an increase in the expected gain in annual income which would be produced if the unemployed could be put to work (for example, through the discovery of hitherto neglected opportunities for the profitable removal of unemployment). A closely related factor would be a reduction in the rate at which the expected stream of such increments to annual income should be discounted (that is, a lengthening of the period during which the costs incurred to eliminate the unemployment would have to be recouped).

One apparent difficulty with Lipsey's concept of structural unemployment is that there may be many ways to lower the trade-off curve. Each way could be justifiable on cost-benefit grounds. Which should be selected? There are three alternative criteria for deciding: (1) on the basis of the highest net pay-off as determined by the cost-benefit studies, (2) on the basis of the greatest reduction in unemployment or (3) on the basis of the achievement of the lowest possible indifference curve. There seems to be no reason, in general, why any two or more of these criteria should lead to the same choice. Lipsey clearly has the choice determined by the third criterion, attainment of the lowest possible indifference curve, and we would not want to quarrel with that. But what guarantees that the point, which is on the lowest indifference curve of all points which can be reached in this way, will not lie to the right of *u*? What guarantees that "structural unemployment" is not negative? This technical point may be of no practical significance; but if it were, there would be no real resolution of the dilemma by resorting to the semantics of the definition whereby structural unemployment is that part of the residual (after the elimination of cyclical), the *reduction* of which could be justified on cost-benefit grounds. Setting this technical question aside, let it be emphasized that elimination of structural unemployment, by Lipsey's definition, does not in general amount to the same thing as eliminating as much employment as could possibly be justified on cost-benefit grounds (the second criterion above). Let this be emphasized lest even the cautious proponents of selective manpower policies (that is, those who stop to evaluate costs and benefits at all) overlook the point.

Estimation of the empirical trade-offs between pairs of the policy goals of high level employment, price stability, and economic growth by Klein and Bodkin (for the Commission on Money and Credit in the United States) confirmed the apparent conflict between the objectives of full employment and price stability but found little relationship between the other pairs of goals.[35] The relationship for Canada has been established by Kaliski[36] and Reuber.[37] Reuber also estimated the apparent reaction function (indifference curves) of the monetary authorities to the alternatives presented by the economy. With respect to the trade-offs, his evidence would also suggest that policies be constructed in relation to the price level and employment objectives since there need be no conflict between these and the growth objective. However, his evidence suggests that Canadian price levels are highly sensitive to international price changes (including the role of exchange rates), a fact which makes the pursuit of truly independent policy objectives very difficult. Without international price changes, Reuber estimates that Canadian price stability would require aggregate unemployment of 5 per cent while an unemployment rate of 3 per cent would lead to price increases of 1.7 per cent annually. For a 2 per cent annual increase in international prices, the 5 would become 8 and the 1.7 would become 3.

An Alternative Approach

Musgrave analyzed price relationships using as tools modified versions of demand and supply curves.[38] These related price not to quantity of output but to employment and of course were aggregative, applying to the economy as a whole rather than to individual markets as demand and supply curves usually do. There is a more or less direct relationship between his supply curve and a Phillips curve, as will be shown.

Because adaptation takes time, the Musgrave supply curve will be steeper (that is, less elastic) in the short run than in the long run. Moreover, if the structuralists are right, the supply curve becomes steep as employment grows beyond its established level at that point in time—that is, expansion of aggregate demand will be "frittered away" in price increases. To avoid this, Musgrave admitted, selective labour market policies may be necessary. What he wanted to emphasize, however, is that these alone cannot create employment (unless prices decline as a result of their implementation, an hypothesis which he considered unrealistic).

In fact, it is an oversimplification to regard either the Phillips curve or Musgrave's curve as a supply curve of labour. Samuelson and Solow expressed this view in the dictum that "There are two parties to a wage bargain".[39] The oversimplification is often very convenient and useful. However, we are not quite sure how to represent what would happen to such a "supply" curve as the result of a hardening of expectation that price increases would be validated by the monetary authorities rather than risk precipitating unemployment. In other words, the reservation price of suppliers may very well depend upon their ease or delay in getting such a price, which in turn will depend upon the buyers' prospects for passing any increases along to their customers. In fairness, it must be emphasized that Musgrave was attempting to depict only the demand-pull cause and not the cost-push cause aspect of the price-level employment relation. The latter, he suggested, might well be "related to the level of employment, rather than the rate of increase in outlays".

The point is that Musgrave's apparently different stance is nevertheless policy-oriented: the question is whether it is more effective to increase aggregate demand or to improve the employability of the unemployed by selective labour market policies. He felt that the choice of appropriate policies would depend on the composition of the unemployed (although others disagree), but that in any event the social cost of unemployment would depend upon its incidence as well as its magnitude.

Summary

The application of general economic policies, monetary and fiscal, designed to eliminate unemployment through the Keynesian prescription of an increase in aggregate demand must take into account the relationship of demand-pull to inflationary movements of wages and prices. As full employment is approached it becomes increasingly evident that a choice must be made between further reductions in employment and holding the line on the rate of increase of wages and prices. This trade-off between alternative desirable objectives of economic policy may be represented either as a relationship between the unemployment rate and the rate of change of money wages, or as a relationship between the unemployment rate and the rate of change of money prices. Although each is sometimes spoken of as a Phillips curve, Phillips himself really estimated the former sort of relationship. The latter relationship is referred to as the trade-off curve. The relationship between the two curves depends in part upon the behaviour of productivity and profit margins.

An important part of Lipsey's contribution to the discussion of structural unemployment has been the specification of the role of policy makers in evaluating the relative costs of undesirable inflation and undesirable unemployment in order to strike an optimal balance—that is, in order to select the best of all possible alternatives open along the trade-off curve. Moreover, he has rightly emphasized the possible scope for selective labour market policies in shifting the trade-off curve downward, so that a generally more attractive range of alternatives will become possible, provided that such selective policies can be justified on cost-benefit grounds.

It is possible to discuss the same subject matter in alternative ways and Musgrave's analysis is an illustration of one such alternative. The trade-off curve or the Phillips curve will undoubtedly remain the framework most frequently chosen by researchers. It is critically important to recognize that this approach summarizes the interplay of many complex processes in such a way as to highlight the conflict faced by policy. It would be roughly true to say that movement *along* the trade-off curve represented the play of demand-pull, whereas movement *of* the curve reflected the cost-push aspect of inflation. Movement of the curve could just as well be said to imply changes in structural unemployment. In the next section, therefore, the discussion is directed specifically to the relationship between cost-push and structural unemployment against a background understanding of the forces of demand-pull.

IV GENERAL ECONOMIC POLICIES AND COST PUSH (CHANGES IN THE TRADE-OFF BETWEEN UNEMPLOYMENT AND INFLATION)

Although it involves oversimplification, it is convenient to regard the influences of demand-pull factors as relating to movements along the trade-off curve and to regard cost-push factors as relating to movements of the curve. This is the view already taken in section III. Cost-push factors can generate structural unemployment. In this section inflationary processes are further considered in order to highlight the factors of cost-push and place them suitably in context in relation to the factors of demand-pull.

Demand-pull versus Cost-push

Underlying the Phillips or trade-off curve are all the factors possibly influencing the general levels of wages and prices. Before the influence of Keynesian thinking, demand-pull was attributed to the effect of the quantity of money, and inflation to too many dollars chasing too few goods. The quantity of money is still regarded as an important factor, but it is recognized that money may be allowed to be relatively idle under certain conditions; so that an explanation of demand-pull must be concerned not only with the quantity of money, but also with its rate of turnover in the financing of purchases of goods and services (the velocity of circulation). If the government should expand both expenditures and taxes (keeping the budget balanced, for instance) without any increase in the money supply, the result could still be inflationary, because interest rates would rise and this would accelerate the velocity of circulation of money. This would happen because the increase in interest rates effectively increases the cost of allowing money to be idle. Of course, Keynesian analysis has emphasized the predominant importance of expenditure flows (such as the increased government expenditure in the above illustration), rather than the quantity of money in determining demand-pull. The quantity of money might be a factor in bringing demand and supply in real terms into balance. But as a rule, inflation would proceed (at a rate determined by structural considerations relating to the determination of profits and the behaviour of tax receipts) until aggregate demand declined (or aggregate supply could be increased) sufficiently to close the inflationary gap (the excess of planned expenditure flows over realizable production flows at full employment).[40]

The elements of cost-push, associated with stickiness of wages and prices in the sense that reductions are resisted, arise from the imperfectly competitive nature of real markets. The term "sellers inflation" refers to the effect of efforts of sellers of all sorts (not only unions) to maintain or raise their shares of national income through price and cost increases. A predominant part of this effort may be the attempt to eliminate wage differentials. Alternatively, "demand shifts" could be the explanation. As the pattern of final demand changes, changes are required in relative prices and wages if individual markets are to be balanced in terms of demand and supply. The easiest way to get such relative changes is to allow wages and prices to rise in areas of expanding demand (it is difficult to force them down in areas of declining demand without substantial and prolonged unemployment). This then raises the average. Further, the impact of these wage and price boosts spills over into other sectors, thus raising prices even more. This is where the trade-off between full employment and price stability arises.

Samuelson and Solow have shown that it is not in fact easy to distinguish between demand-pull inflation and cost-push inflation. They cite the common fallacy that increases of wages at a rate greater than the rate of increase of productivity necessarily imply cost-push inflation. To see the error, assume that the rate of increase in productivity is zero. Then any rate of increase in wage rates will be greater than the rate of increase in productivity. And yet wages would necessarily increase as prices increased unless the full increase in the value of output were to go to profits. Thus in a case of pure demand inflation, the very relationship could arise which has been proposed as a test of cost-push inflation. Tests based on the timing of changes also fail because there is a virtually continuous chain of wage-price-wage changes, so that it is impossible to specify cause and effect. Indeed, because of the influence of expectations, effects may precede causes.

The final outcome of an inflationary process, Samuelson and Solow concluded, would depend upon the relative effectiveness of those factors tending to reduce real demands (an increase in the share of national income going to profits, reductions in the purchasing power of money balances, the progressivity of the tax structure, the squeeze on fixed incomes) and those factors tending to increase real demands (recent past experience with inflation and expectations for its continuation, and expectations of rising prices but constant interest rates in an imperfect capital market).[41]

The Effect of a Full-Employment Policy

The possible inflationary pressure of labour unions in times of full employment prompted Reder to consider alternative national wage-price policies.[42] His model incorporated something analogous to an aggregate supply curve (relating output to the price level) rather than a Phillips curve. His construction implied that in order to maintain full employment, the government would have to permit increases in the price level whenever the level of money wage rates was raised or the mark-up per unit of production was raised. Given labour unions and monopolies of sufficient power, either or both of these things could occur even prior to full employment. The "claims" to shares of national income of wage-earners, employers and fixed income recipients might well be incompatible in real terms (that is, in the light of price changes) and the fact disguised by expressing the claims in money terms (that is, without regard to price changes). If this were true at all price levels, the price level would rise through time without ever reaching a point of balance. That such should be true at all price levels, Reder argued, is much more likely to be the case when full employment is "guaranteed".

> Thus it may be that depression, or the threat thereof (and it would be difficult to keep the threat effective without an occasional demonstration), is necessary to keep the monetary system from breaking down in a hyper-inflation.[43]

Reder considered the situation as essentially one of trilateral monopoly, the participants being the unions, the employers and the monetary authorities. In the process of trilateral bargaining, the monetary authorities would, in effect, be armed with the instruments of the price level and the level of real national income (employment).

> Under such conditions, binding the hands of the *de jure* monetary authorities by committing them to some specific policy (e.g. maintaining either full employment or a constant price level) will definitely diminish their ability to bargain.[44]

The monetary authorities of course would not be independent of political influence; so that realistic situations may be expected to lie somewhere between the extreme of trilateral monopoly and the extreme of a unified monetary authority in the sense of ordinary monetary theory (including Keynesian), which assumes that society contains only one entity able to take a global stand in the face of which others must make the appropriate adjustments. Reder thought it might be wise to develop unified labour and employer organizations to permit realistic bargaining (taking all the consequences into account). He concluded his discussion with some wistful thoughts inspired by Henry Simons' program for the destruction of "monopolies" as a prerequisite to the operation of a successful monetary policy,[45] and the observation that the alternative of regulation of wages and prices by administrative decree would merely serve to create trilateral monopoly problems in each industry.

Effect of the Policy Mix

Given the objectives of full (or acceptably full) employment and acceptable price stability, there remains the matter of choosing among alternative possible combinations of monetary and fiscal policies any of which will bring about the desired result. Reuber tested for an influence of the behaviour of the money supply (in either real or nominal terms) on the trade-off curve but came to the conclusion that it was invariant with respect to changes in monetary policy and in the mix of financial policy. His evidence is therefore consistent with the view that financial policies influence only the level of aggregate demand and hence the point *on* the curve, not the position *of* the curve. *A priori* arguments to the contrary have been based either on the alleged benefits of an optimal matching of policy instruments and objectives, or on the proposition that important expectations are highly responsive to the performance of the authorities. Within the range of postwar experience there would seem to be little evidence to support either view.[46]

The idea that the mix of monetary and fiscal policies might influence the position of the Phillips or trade-off curve is sufficiently attractive to merit further testing. For one thing, there is a need to distinguish between the possible effect of variation in the mix of policies and the possible effect of the inappropriateness of the overall policy package (for example, allowing persistent cyclical unemployment or excessive inflation). Also, alternative ways of testing for effect on the trade-off curve could be tried. A summary measure of the impact of fiscal policy might appropriately be the full employment surplus relative to full employment Gross National Product. The full employment surplus represents the budgetary position of the national government on a National Accounts basis, given the structure of taxes and expenditures, at a level of Gross National Product which would require the employment of all but the frictionally unemployed. Similarly, a summary measure of the impact of monetary policy might appropriately be the money supply, real or nominal, relative to full employment Gross National Product. It is not clear that Reuber tried these particular formulations or even any direct measure of fiscal impact. Since we do believe that selective manpower policies could influence the position of the trade-off curve, it seems reasonable to suppose that other changes in the mix of policies might have a similar effect.

Reuber seems to be the only one who has carried out any relevant research, and his results therefore are the record to date: there is no evidence of any such influence.

The View from the Top

How thoroughly do policy makers appear to understand the forces of inflation and the nature of the trade-off alternatives before us? No precise answer can be given, but the record in Canada clearly reveals a degree of failure.

Reuber argued that the reactions of the authorities could be interpreted either as substantial misjudgement of the actual empirical trade-offs, or as a reflection of a higher priority for price stability in relation to higher employment than the relative economic costs of more unemployment and more price inflation would warrant. Knowledge of what we have termed the trade-off curve is critically important in any case, and research such as Reuber's will therefore continue to be much in demand. On his second interpretation, Reuber's estimates of the reactions of the authorities constitute partial estimation of one of Lipsey's indifference curves.

Harry Johnson has insisted that we have suffered from a fear of inflation created by the mistaken policies of the postwar period.[47] In other words, the choice of policy instruments and degree of their utilization may through the experience to which they give rise subsequently alter the policy makers' subjective rate of trade-off between policy goals (Lipsey's indifference curves). This view would be consistent with Reuber's estimates of the apparent anti-inflationary bias of Canadian monetary authorities.

A Brief Outline of Modern Economic Policy[48]

According to the modern theory of economic policy, there must be as many policy instruments as there are policy objectives. Fiscal and monetary policies may be regarded as alternative instruments for controlling the level of aggregate demand; but they will have different effects on growth or on the balance of payments and therefore, through the influence of international prices, perhaps different effects on the domestic price level. Given a fixed exchange rate, fiscal expansion to cure unemployment will tend to augment the deficit on current account (primarily relating to trade in goods) but induce a net increment in inflow of capital through higher interest rates and profits and so move the capital account toward surplus. Monetary expansion would lower interest rates and worsen both the current and capital account. The right combination of fiscal expansion and monetary contraction is called for to achieve the twofold objective of full employment and balance of payments (including current and capital account) equilibrium. If the policy were to be carried to the point where inflation became a problem, balance of payments disequilibrium would once again emerge. There should be a third instrument or one less objective. That is, it may be necessary to fix the exchange rate at the appropriate level or to ensure external balance with a floating (flexible) exchange rate. With a flexible exchange rate, fiscal expansion tends to raise employment but also to increase foreign competition, because interest rates rise and attract foreign capital, resulting in an increase in the exchange rate (which makes imports cheaper and exports costlier). Both the direct and the indirect effects of monetary expansion would tend to increase employment, given a flexible exchange rate. The main reliance in Canada up to 1962 should therefore have been placed on monetary policy, whereas, on the contrary, expansionary fiscal policy was employed in a vain attempt to offset contractionary monetary policy.

Summary

Demand-pull forces are directed primarily through the operation of monetary and fiscal policies. Market imperfection accounts for some upward pressure in wages and prices before full employment has been reached. This upward pressure probably ought to be regarded as cost-push, but in this chapter the usual practice has been followed whereby the systematic influences determining the shape of the Phillips or trade-off curve are included under demand-pull.

Changes in systematic behaviour of these same factors lead to changes in the shape and/or position of the Phillips or trade-off curve, and these are usually thought of as the factors of cost-push. It is virtually impossible in empirical research to distinguish inflation which is demand-pull from that which is cost-push. Phillips tried to do so by interpreting his curve in the way which has been explained here. That clearly will not do as a means of distinguishing between types of inflation.

But Phillips' relation has emerged, transformed into the trade-off curve, as an invaluable tool of analysis of the alternatives, and the conflicts, faced by economic policy. Its use in the analysis of structural unemployment justifies in the present context the blurring of distinctions between demand-pull and cost-push. The distinction has been reconsidered here because selective labour market policies are directed at the elements of cost-push, with which structural unemployment is associated.

Cost-push has its roots in imperfection in the labour market. reinforced by the bargaining power of unions. It is even possible that the government is a contributing agent on account of a clearly-stated determination to maintain "full" employment. Apart from the effect of this guarantee, it has been argued that the mix of aggregate governmental policies would affect the position of the trade-off curve. It has also been suggested that periodic episodes of non-optimal policy (failure to live up to the guarantee) would shift the trade-off curve, but this may simply be the obverse of the proposition about the guarantee. There is no conclusive evidence on these issues.

Nor is there conclusive evidence that policy makers have misunderstood the specific choices with which the trade-off curve has confronted them. There is fairly strong evidence, however, that they have either misunderstood or taken an unrealistic view of the relative costs of inflation and unemployment—that is, shown an exaggerated fear of inflation. The relevance of this for the structural unemployment debate is of course the implication that aggregate demand has not always been expanded to the optimal limit and that therefore the problem of structural unemployment has been more apparent than real.

Modern economic policy—particularly in an economy such as Canada's, with its degree of dependence upon international trade—is a complicated and demanding task-master. The objectives of economic policy ordinarily include reasonably full employment, acceptable price stability, balance of payments equilibrium and an adequate rate of economic growth. Conflicts may develop between other pairs of objectives in addition to the conflict between price stability and full employment. Policy tools include monetary, fiscal and exchange rate policies. Policies called into play for one purpose may produce undesirable side-effects elsewhere. Careful consideration must therefore be given to determining the appropriate policy mix. In particular, selective labour market policies, directed at improving the trade-offs through elimination of structural unemployment, should be considered within the context of the overall package of policy tools and the multiple objectives of economic policy.

V MOBILITY: THE KEY TO SELECTIVE LABOUR MARKET POLICIES

Selective labour market policies constitute a broad approach to the problem of unemployment alternative to policies directed at the level of aggregate demand and expressly designed to cope with structural unemployment. Specific proposals will not be evaluated, or even listed, here. The common element in these proposals is facilitation of mobility in the labour market. Attention is therefore directed to the question of why mobility is important. The answer, essentially, is that mobility influences the form and position of the trade-off curve (and therefore the problem of structural unemployment). Thus it becomes important, in turn, to examine the factors influencing mobility.

The Importance of Labour Mobility

Since the collapse of the gold standard in 1931, the monetary system has had to accommodate itself to changes in wages (previously the reverse was true). Hicks has spoken of the new Labour Standard, under which the value of money emerges as an incidental "by-product of the process of wage-fixing".[49] Indeed, unemployment led not to the collapse of the non-economic wage structure which had given rise to it, but to the collapse of the gold standard.

The question which then arises is that of determining the extent of the inflationary bias under the new system (as it is continually modified by the growth of unions, collective bargaining and the public regulation of wages). Bargaining between monopolists could lead to almost any outcome. Non-economic forces play an important part. Concern over wage differentials and employers' profits reflect labour's battle for an increased share of national income. The inherent incompatibility of such demands feeds the fires of inflation. Labour mobility can help control them.

The trouble is that mobility is a one-way street. The skilled *may* readily cross over to unskilled trades but the less skilled will not so readily be able to move over to fill vacancies among the skilled. Hicks thought the unemployed would be unsuitable to fill the vacancies even if they were trained. This is a particularly strong version of the structural difficulty in achieving full employment. Those who would be suitable would not move into the areas of expanding demand unless wage differentials offered sufficient incentive. But collective bargaining is directed, by the unions, at making wage differentials as narrow as possible—that is, at each of its members getting as much as the other guy. Here is another built-in, or structural, conflict or incompatibility in the behaviour of labour. It is impossible to have full employment, under these circumstances, without having at the same time a scarcity of skilled labour.[50]

The Hicksian account is a particularly lucid and coherent treatment of "mismatching". Mismatching is attributed to inability of the price system to handle the problem of allocating labour appropriately. The inability lies in the fact that collective bargaining is aimed in part at curbing the operation of the price system—that is, at eliminating the very wage differentials that would be required for rapid economic growth, full employment and price stability.

Nevertheless, Hicks concluded on the optimistic note that special circumstances had contributed to the inflationary experience in the United Kingdom in the decade following 1945, so that the Labour Standard need not be as biased as that experience would otherwise suggest. The special circumstances were the dismantling of wartime controls and the need for the establishment of a new pattern of relative wage rates following the wartime disturbance.

Mobility and Structural Unemployment

The mismatching of men and jobs arising from inadequate mobility was the focal point of Reder's study, leading to several key observations.[51] (1) Employers trade off worker quality against the length of time a job remains unfilled. Excess demand for workers in a particular occupation usually leads to complaints of shortages (increased vacancy periods), wage increases, upgrading and/or accelerated promotion of workers, and complaints of reduced worker quality. (2) The simple view of price-quantity interactions should therefore be modified to take into account variations in worker quality and vacancy periods, the restrictive effect of unions notwithstanding. (3) The markets for skilled workers adjust rapidly to excess supply or demand so that unemployment falls instead on the unskilled.[52] A normal increase in aggregate labour demand pulls workers up the skills-ladder and leaves room at the bottom for new entrants to the industrial sector from what might be called the household sector. Exceptionally rapid increases in aggregate labour demand will raise the rate of wages for the unskilled above the social minimum and relative to the rates for skilled. Such developments were held to have occurred during each of the World Wars. Return to the previous relative wage rates was said to have been inhibited by the acceptance for on-the-job training of workers of unusually low standards and by experimentation in simplified methods of production in order to accelerate training and curb its cost. (4) This "Paradigm of the Job Ladder" is applicable only to situations where there is only one port of entry to the relevant economic sector (the bottom rung); but the ladder may relate to occupations, social classes, races, ethnic groups, length of service, age and so on. The overlapping of these ladders becomes relevant in the analysis of structural unemployment. (5) The skill margin in wage rates should shrink in upswings and expand in downswings to the extent that it varies cyclically at all.

The proposition that the underemployed skilled tend to substitute for the unskilled who on that account become unemployed during recession has a serious contender as an alternative explanation in Dr. Oi's argument that differential lay-off rates are to be explained by the higher cost of selecting and training workers relative to the employer's hourly cost of compensating them for skilled than for unskilled workers. Reder's proposition implies that the *level* of unemployment will be higher among the unskilled at all phases of the business cycle, whereas Oi's implies nothing about differences in *levels* of unemployment by skill level.

With respect to the occupational structure of the unemployed, Reder's empirical investigations led him to four conclusions.

(1) The unskilled do indeed have higher percentages of unemployment than the skilled at all levels of business activity (perhaps due to worker preference at low levels of *aggregate* unemployment but due to the wage rigidity factor at other times). (2) Frictional unemployment is relatively greater among the unskilled. On this account a decline in aggregate labour demand that led to an equal absolute increase at all occupational levels in the difference between separation and hiring rates would lead to a *decrease* in the unemployment rate of the unskilled *relative* to every other occupation. This "frictional effect" would dominate the "ladder effect" when the change in the overall unemployment rate was small. (3) Unemployment, viewed as waiting in line for a job, is influenced by the same set of considerations bearing on waiting in line for promotion: the unskilled are vulnerable on either count. The average duration of unemployment should increase especially for new labour force entrants. (4) The effect of (3) should be to increase the margin in wage rates for skill when the overall employment percentage rises, but the evidence is suggestive rather than conclusive.

Because the unskilled workers include "disproportionately large numbers of negroes, immigrants, rural-urban migrants, youths and persons with little schooling", Reder argues, the paradigm of the ladder has implications for social mobility following from the employers' consensus concerning the order of preference in selecting job applicants (and the importance of educational attainment in that order of preference).

Factors Influencing Mobility

In the volume of essays, *Labour Mobility and Economic Opportunity*, Gladys L. Palmer in the final essay attributes to various aspects of labour mobility much of the growth in American productivity over the years.[53] Philip M. Hauser studied labour force participation rates as a framework for all other types of labour mobility and found the overall rates quite stable in Western countries, in spite of radically changing underlying factors.[54] The "additional-worker" effect (whereby other members of the bread-winner's family seek jobs when he becomes unemployed) seemed to be dominated by the tendency of others to drop out of the labour force during periods of high unemployment.

Palmer's study of the Philadelphia labour market revealed actual mobility to be lower for women than for men, which suggests that the rising proportion of women in the labour force would lead to a reduction in overall mobility. Dale Yoder showed that mobility appeared to decline for older age groups. Palmer demonstrated that mobility declined during depression. Charles L. Myers confirmed this and found that rising employment seemed to contribute to mobility more than high employment. Mobility did not appear to be lower for union workers than for non-union workers. Palmer found that accidental factors were significant in the choice of first jobs which, at any given time, could be a high proportion of the total. This is an important consideration for manpower policies which depend for their success on systematic behaviour. The studies confirmed the Reynolds and Shister finding that workers do not carefully weigh job alternatives, have limited knowledge of alternative opportunities and make very little use of formal placement services. Dale Yoder found in his studies of Minneapolis and St. Paul that those changing jobs were not, in general, able to state reasons for doing so.

In his essay on "The Balkanization of Labor Markets", Clark Kerr outlined an increasing tendency for formal and informal rules to determine the boundaries of markets.[55] There is not one "structureless" labour market but a "structured" set of submarkets, interrelated, yet separated by skills and institutional factors.

Craft unions have evidently tried to adjust labour supply to demand (once the wage has been fixed), by regulating the admission of new members. Industrial unions cannot control supply and have rather sought to assure employment for those with seniority rights. Either way, "wage rates are less effective in allocating labor (just as the movement of labor is less potent in setting wage rates), than they are in less structured labor markets".[56]

Gladys Palmer argued that mobility contributed to economic growth and to a reduction in the severity of localization of unemployment, but that these values were threatened by a secular decline in mobility resulting from what she described as workers' "greater equities" (vested interests) in their jobs. Such a decline in mobility would be voluntary, apparently, and it is therefore not obvious that efficiency has declined as well. Immobility may not always be voluntary, of course, and this may be the case especially for minority groups. Immobility may then be a source of vulnerability.

Harry L. Gilman has investigated the widely held proposition that members of minority groups are "the last to be hired and the first to be fired".[57] He found that "(a) the level of unemployment has been persistently greater for nonwhite than for white workers, and (b) the absolute cyclical variability of unemployment rates has been greater for nonwhite than for white workers". He attempted to isolate the effect of low levels of skill from the effect of discrimination at the points of hiring and firing because of the different implications for policy. There was some evidence of "greater wage rigidity for nonwhite workers in the presence of discrimination against them". Without a lessening of discrimination, attempts to enforce wage minima or wage equality for equal skills would reduce employment opportunities for nonwhites.

Gallaway took as starting point for his study of resource allocation and structural unemployment the general proposition that restrictive practices and immobility have created a multiplicity of relatively independent labour markets.[58] The alleged failure of the labour market as an allocative mechanism could relate to the determination of the general price of labour relative to other factor prices or to the failure to shift labour from one sector of the labour market to another. That is, the breakdown could be in either the interfactor or the intrafactor allocative process. The former might be more susceptible to a solution by the application of general monetary fiscal controls. Gallaway pointed out that the distinction between the two types of failure "is crucial for postulating the nature of the Phillips curve which is appropriate for policy considerations". Gallaway conducted an empirical evaluation of allocative efficiency among sectors of the labour market. As background, he reviewed the theory.

He assumed initially a fully employed two-sector economy in which: (1) there was perfect mobility of labour between sectors; (2) there were no economic costs, either private or social, associated with this mobility; (3) all labour was of the same quality or skill-level; (4) workers attempted to become as well-off as possible, given their preferences and attitudes toward work and leisure; (5) all workers in both sectors had the same preferences in relation to these factors; and (6) there were no non-wage elements of money income associated with unemployment.[59]

Perfect mobility was then defined as an absence of non-economic (non-price) barriers to mobility. Under the above assumptions, and given the usual labour supply and demand relationships in both sectors, equalization of wages in the two sectors would result. Differential wage rates in the real world would, therefore, necessarily be the consequence of the violation of one or more of the conditions assumed to hold in the model. The model of an ideal economy is used as a measuring rod to assess the actual performance of the labour market in the real world.

Gallaway demonstrated that the possible results of discrepancies between the model and the real world could be classified as originating either with economic barriers or with non-economic barriers to mobility. The former would not indicate any lessening of the efficiency of the labour market as an allocative mechanism, but the latter might very well do so. Both would be accompanied by wage differentials; involuntary unemployment might also accompany the non-economic barriers.

One aspect of labour market efficiency to which Gallaway merely drew attention was the mechanism for allocating labour in general in relation to capital. Since the paper by Professor Kotowitz deals with the subject matter of the aggregate production function, this aspect of allocation will not be considered here.

Summary

This discussion of labour mobility has taken off from the point of the inflationary bias implied in the trade-off curve, portrayed here in terms of what Hicks has called the Labour Standard. The degree of inflationary bias in the system can be lessened through increased mobility. Selective labour market policies aim at increased mobility as a means of attaining a reduction in structural unemployment, a reduction in unemployment which would otherwise not be possible without unacceptable rates of inflation. Hicks appeared less optimistic than Berman about the prospects for increased mobility through retraining, and more optimistic than most others about the potential contribution of greater wage differentials between the skilled and unskilled. He was optimistic, too, in his view that the apparent inflationary bias, at least in the United Kingdom, had been overstated somewhat by a series of special circumstances.

Reder's analysis of the "Job Ladder" and the structure of the unemployed led him to important conclusions on the differential impact of overall unemployment over the course of the business cycle. In the light of these predictions on how cyclical unemployment gets distributed among various skill categories, it is possible to assess the arguments of those who look to such differential impact as evidence of structural unemployment. In other words, it is entirely possible for two important propositions to be true at the same time. It may be true that variation in aggregate demand will, for a variety of reasons relating to labour mobility, lead to associated variation in rates of unemployment which differ from one category of labour to another. It would be wrong to infer that such unemployment was "structural" if this were meant to suggest that it could not be eliminated through expansion of aggregate demand. It may at the same time be true, however, that increased labour market mobility would permit a further reduction in unemployment through an expansion in aggregate demand (without unacceptable inflation, and without particular implication for the distribution of unemployment among categories at any particular level of the overall unemployment rate).

The factors influencing mobility are many, and selective labour market policies therefore may take a bewildering variety of forms. Labour force participation rates are a key factor in mobility. Stability of the aggregate participation rate over the course of the business cycle apparently covers differing directional responses among categories of workers (categories based on age, race, sex and so on).

Institutional barriers continue to grow between segments of the labour market; and the market, as a result, becomes increasingly "structured" and vulnerable to structural unemployment. Unions have been partly responsible for this. Workers themselves may exhibit a secularly increasing demand for immobility but those who have immobility thrust upon them (for reasons of age, sex, colour and so on) are vulnerable on that account. The fact of discrimination in conjunction with the reduction in differentials in real wages involved in the enforcement of minimum wage laws will shunt a structural unemploy-

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ment burden on to those against whom discrimination is directed.

Labour mobility is an important consideration in long-run growth as well as in short-run full employment without excessive inflation. In general, mobility facilitates resource allocation. Gallaway has postulated a model of a perfect labour market as a standard for examining the consequences of different sources of break-down in the system. The break-down could be connected with the allocation of labour in general, in relation to non-labour inputs, or with the allocation among different types of labour. In the latter event the non-economic barriers to labour mobility constitute a source of inefficiency in the labour market as an allocative mechanism and give rise to structural unemployment.

VI EMPIRICAL STUDIES

It is not possible within the scope of this chapter to do justice to the empirical studies relating to structural unemployment. The technical detail of these studies is absolutely necessary to an evaluation of them, and it is virtually impossible to cover the same ground adequately without reference to the technical language that has been developed as a tool in such investigations. The best review, in that it is constructively critical, comprehensive and carried out with moderate reliance on technical language, is that of Lipsey.[60] This section will rely heavily upon his critique from time to time.

Estimates of the Phillips or Trade-off Curve

In the main discussion of the Phillips and trade-off curves, reference has already been made to some of the empirical work. There has been a great deal of work in this area and it can be afforded only passing mention here. In June of 1966, Professor F. P. R. Brechling presented a paper to the Canadian Political Science Association meeting in Sherbrooke, Quebec on "Some Empirical Evidence on the Effectiveness of Price and Incomes Policies", based on the experience with such policies in Britain and the United States. In Britain, the policies appeared to affect the rate of increase of wage rates but to affect prices only after a lag of three to four quarters or not at all. For the United States, changes in wages and prices "tended to rise at a lower rate after 1961 than in comparable periods before 1961". Although this would be consistent with effectiveness of the price and incomes policy, Brechling discussed three alternative possible explanations:

(1) The long experience with price stability prior to 1961 which had subsequently led price and wage negotiators to bargain as if general wage and price levels would remain constant.

(2) The slow rate of expansion in economic activity since 1961.

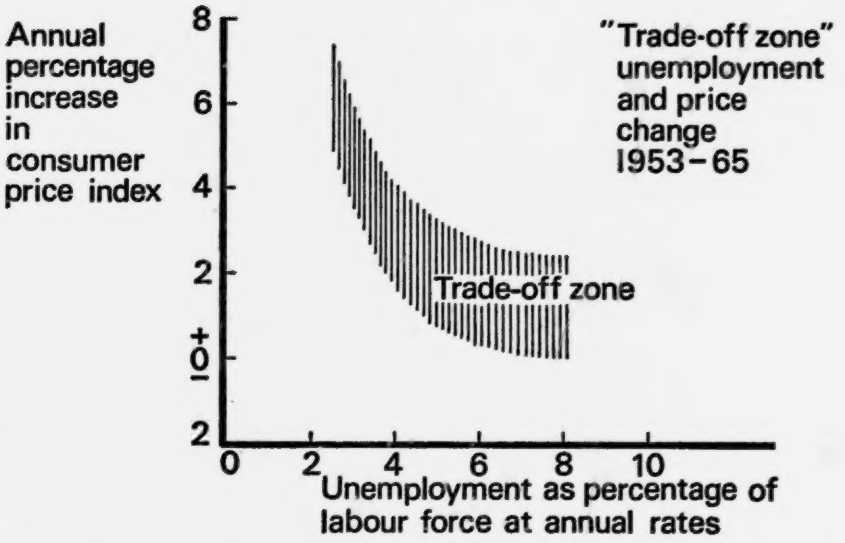
(3) Simler's argument that the unemployment rate should be adjusted for "hidden unemployment" (arising from a fall in labour force participation rates below those which would prevail if there were full employment) before the Phillips curve is estimated.

Evidently Simler's adjusted estimates were such that the observations after 1961 seemed much less unusual. There remained, however, some evidence that the period was atypical, possibly because of the influence of price and income policy.

In a recent study for the Economic Council of Canada, Bodkin, Reuber, *et al* reviewed most of the empirical work on the Phillips curve and the trade-off curve and added new estimates of their own.[61] The survey of the literature is more comprehensive and at a level of greater technical detail than that attempted here and is valuable reading on that account alone. These latest estimates contribute to the continuing process of refinement in our measurements, but the essential ideas for the purposes of a discussion of structural unemployment have already been considered here. A graph of the "trade-off zone" (that is, the trade-off curve with a margin for uncertainty) which appears in the *Third Annual Review* of the Economic Council of Canada,[62] is reproduced in Figure 4-3.

Tests for the Presence of Structural Unemployment and/or Measures of its Magnitude

It is convenient to think of the measurement problem of structural unemployment in terms of three questions. (1) "Does structural unemployment exist?" (2) "It it increasing?" (3) "Is it important?" Demsetz set out to answer all three as a test of one version of the structuralist hypothesis.[63]



Source: Economic Council of Canada, *Third Annual Review*, Queen's Printer, Ottawa, 1966, p. 144.

Figure 4-3

First he argued that the hard core unemployed, if they exist, should be a higher fraction of the unemployed in prosperous years (for they will remain unemployed while others get jobs) if the years compared are not far apart. He accordingly compared 1957 (prosperous) with 1960 (recessionary) for male and female labour groups separately by various age categories. Actual 1957 unemployment rates were compared with rates for 1960 estimated on the basis of the labour-force structure of 1957. This was designed to abstract from the secular increase in younger workers and female workers over the period. In both the male and female age groups, 14 to 19 and 65-and-over, and for all females together, the groups of workers that might be thought to contain the hard core unemployed, the estimated 1960 percentage was *lower* than the actual 1957 percentage of overall unemployment. Demsetz thereupon concluded that the structural hypothesis could not be rejected. He pointed out that the Council of Economic Advisers had come to the opposite conclusion because of a contrary view of what the structuralist hypothesis should imply—that is, the Council claimed that hard core unemployed ought to be a *larger* percentage in the later (recessionary) year.

To test the second element of the structuralist hypothesis, relating to secular growth in importance of the structurally unemployed, Demsetz tried to abstract from the effect of the cycle. For the period January 1949 to September 1961, he sorted months by the value of the seasonally adjusted unemployment rate and found only the unemployment rate category 5 to 7 per cent to span a significant portion of this time interval. Examination of the percentage distribution of unemployment for months with unemployment rates between 5 and 7 per cent, 1949 to 1960, for both sexes aged 14 to 19, for females over 14 and for females over 14 combined with males 14 to 19, revealed a secular increase which was particularly strong for the female group. This trend, together with the trend toward proportionately more women in the labour force, would push overall unemployment rates up. Secular growth in the hard core unemployed would therefore seem to be confirmed.[64]

The third part of the structuralist hypothesis as interpreted by Demsetz states that structural unemployment can account for a significant percentage of the unemployed. To test this, Demsetz assumed that there were no structurally unemployed in 1948 and 1949 and that structural unemployment in 1957 and 1960 was limited to females and young males.[65]

Because of the obvious downward bias of these assumptions, estimates based upon them were to be regarded as lower limits on the number of structurally unemployed. Demsetz essentially assumed that the percentage distribution of unemployment in 1960 would have been the same as in 1949 had it not been for the more rapid rate of growth in the numbers of females and young males in the labour force. Estimating cyclical unemployment accordingly and subtracting from actual unemployment, Demsetz obtained his measure of structural unemployment as about 10 per cent of the unemployed. He regarded this as "borderline" but warned that from 1960 to 1961 the amount seemed to be growing. His procedure would classify 12 per cent of the increase in total unemployment from 1957 to 1961 as structural; the Council, Demsetz observed, had calculated 22 per cent and labelled the extent "minor".

Gallaway looked for evidence of the existence of structural unemployment in another way. He essentially applied the model of labour market efficiency described in the last section (with additional assumptions to make it directly testable). This led him to expect a history of relatively constant money-wage differentials between sectors. In other words, (1) sectoral wages through time should move closely together in the absence of involuntary unemployment. When involuntary unemployment develops, a highly efficient mechanism will allocate it evenly throughout the market so that (2) sectoral unemployment rates might also be expected to show high correlation.

Because of the strong upward secular trend in prices and real-wage rates, sectoral wage rates might be expected to move together on that account alone. Increased inefficiency might, therefore, rather be expected to result in changes over time in the dispersion of sectoral wage rates or in the order in which they were ranked. This implication was therefore also tested, using real wage rates.

Gallaway employed a measure of the degree of correlation in a group of wage-rates, unemployment rates and so on. Classified by industry, unemployment rates were significantly positively correlated, as were wage rates (annual income per worker as a proxy). This would imply efficiency; but, on the other hand, dispersion of wage rates increased. Classified by occupation, significant positive correlation among unemployment rates implied efficiency, but insignificant correlation among incomes suggested the contrary. Classified by region, significant positive correlations were found for incomes and for unemployment rates; increases in regional dispersion apparently merely reflected the widening of industrial differentials; and there appeared to be no appreciable change in the rank order of the sector wage rates. On all counts the evidence suggested efficiency. In all cases, the period 1948 to 1960 was covered. Gallaway concluded that the labour market is an efficient allocator regionally but that there is some evidence that, occupationally and industrially, union members gain at the expense of the non-unionized. More directly, he rejected the structural unemployment thesis insofar as it depended upon inefficiency in allocation within categories of the labour market; but he allowed the possibility that upward wage-push of the unions together with downward stickiness of non-union wages might have resulted in disruption in the allocation between categories of a sort which could prove inflationary if fiscal and monetary policy were used to try to eliminate the associated unemployment.

Since Gallaway never defined structural unemployment as such, it is difficult to say whether or not he expected us to believe it increases when dispersion increases. We are simply told that periodic deviations from full employment will be allocated evenly by a highly efficient mechanism. The allocative mechanism, he stated, is efficient as long as there are merely economic costs of mobility. He also stipulated that there be no substantial shifts in the costs of mobility. But he did not require—nor does there seem any basis for requiring—that these costs (objective and subjective) of mobility be the same in all sectors. Without equality of these costs of mobility among sectors, there is no reason to believe that a highly efficient mechanism will allocate unemployment evenly throughout the various sectors. Reder's "Job Ladder" argument illustrates the point. In other words, given the framework of non-economic barriers which permits the existence of involuntary unemployment at all, an increase in aggregate unemployment will be allocated unevenly throughout the various sectors, in part because of the non-economic barriers (inefficiency) but also in part because of the differing costs of mobility. The assumption of no substantial shifts in the costs of mobility therefore becomes critical to the interpretation of increased dispersion as evidence of increased inefficiency.

Gallaway's statistical procedure was challenged by Stoikov, whose own estimation method appeared to him to contradict Gallaway's conclusion.[66] Gallaway admitted that his test would not be sensitive in all cases but argued that a correct interpretation of Stoikov's results would support, rather than contradict, his own conclusion of the absence of increased dispersion among rates.[67]

In his outstanding contribution to the discussion of full employment, Lipsey[68] surveyed the evidence adduced by others for and against the structuralist hypothesis.[69] He agreed that Gallaway had specified one version of the structuralist position, but contended that Gallaway's predictions would not necessarily follow from his assumption: if the unpredictable declines in demand fell on sectors with below-average unemployment, dispersion of sectoral rates could decrease rather than increase. This criticism of course applied to all who have looked for increased dispersion among sectoral rates as evidence of structural change.

Knowles and Kalechek in their work for the Joint Economic Committee of the U.S. Congress undertook research on this theory.[70] Their investigations involved far more and served to spark most of the discussion about and research into structural unemployment. The bulk of Lipsey's survey dealt with the Knowles and Kalachek tests.[71] Their explanation of the dispersion in rates of change of sectoral unemployment rates in terms of the change in the overall rate he regarded as a very weak test of the proposition that productivity increases had not become more concentrated, because we should expect in any event that changes in the overall rate would be the dominant influence on the dispersion index. The theory is not good enough to specify "*by how much* we should expect the correlation between the dispersion index and the level of unemployment to be affected by a given amount of structural unemployment".[72]

As for the claim that aggregate demand was not deficient from mid-1957 on, Lipsey used a proposition, considered in various forms earlier in this chapter, to the effect that equality between aggregate demand and aggregate supply would imply inflation unless wages were as flexible downward as upward or were altogether independent of the state of excess demand in individual markets. He concluded that, because there was no inflation from 1958 to 1960, aggregate demand had not been adequate.

An analysis of the occupational composition of the labour force following 1957 was inconclusive but, Lipsey observed, not damaging to the structuralist position. Knowles and Kalechek claimed that structural unemployment would be concentrated in blue collar occupations and goods-producing industries. The lack of specific quantifiable predictions from the theorizing again, in Lipsey's view, plagued the interpretation of what could have been the useful evidence that unemployment rates by industry and occupation behaved in much the same way over time.[73]

The Knowles and Kalechek claim that there had been a once-for-all increase in unemployment rates around 1958, rather than a trend, was also unsupported as far as Lipsey was concerned. He dismissed as irrelevant their observation that the acceleration of productivity changes did not exceed that of the 1920's (that is, could not have been exceptionally high and therefore presumably could not have been a source of structural unemployment over the period).

Lipsey rejected the idea of a once-for-all structural change at this time on the grounds that "both inflationary pressures and labor bottlenecks were observed to diminish rather than increase".[74] The structural hypothesis of a gradual change was more difficult to test.

Knowles and Kalechek concluded, on the basis of low correlation between production worker man-hours and output per man-hour, that accelerated productivity changes did not appear to have contributed to higher unemployment. Lipsey demonstrated that the relation between these two was complex (and that the complexity was compounded by the stage of the business cycle) and that it was therefore virtually impossible to interpret correctly such a relationship.[75] The effects on productivity over the course of the business cycle would swamp the effects possibly arising from changes in technology (for a given level of employment).

Lipsey's major criticisms were (1) that so little attention was paid to the predictions of the alternative aggregate demand hypothesis that the work could not be accepted as a serious comparative study of competing theories; (2) that only a single and rather extreme version of the structural transformation hypothesis was studied; and (3) that the lack of a formal model meant that quantitative predictions were imprecisely formulated.[76]

The key to Lipsey's analysis is found in his statement that:

> There is no reason why structural unemployment should not give rise to the same characteristic mix among the unemployed as would occur with deficient-demand unemployment. The only difference would be that with structural unemployment the mix of the *employed* would represent the mix at which new labor would be taken on as production increased, while this is not so with deficient-demand unemployment.[77]

Therefore, no conclusion can be drawn from the characteristics of the unemployed as long as there is some deficient-demand unemployment in the economy. While arguing the difficulty of performing the test, Lipsey stressed the plausibility of the view that there have been growing structural problems as well as deficient-demand unemployment. He cited Eckstein's evidence of the lack of use of price adjustments to ease dislocation in the labour market in support of the view that greater price and wage flexibility could undoubtedly do more to even out the incidence of unemployment, thereby contributing to the efficiency of policies affecting only aggregate demand. But he emphasized that the effectiveness of price adjustment would be severely constrained by the limitations of productive techniques permitting too narrow a variation in the relative rates of employment of inputs to ensure full employment of all inputs at acceptable prices (in the face of starvation or other minimal levels of wages), and by the unprofitability of directing the innovative process to the search for alternative means of employment.

Lipsey did not attempt to measure the magnitude of structural unemployment. To do so, on his definition, we would require estimates of the indifference curves as well as the results of a great deal of cost-benefit analysis.[78] The principle of cost-benefit analysis of policy proposals is an admirable one and has been advocated by many economists. Apparently, the only research result available is that of David Page who conducted a cost-benefit analysis of 618 men and 289 women from all areas of Massachusetts who were assisted as retrainees under state law between 1958 and 1961.[79] An analysis of this experience was intended to reveal the potential of the United States Manpower Development Act. Page concluded: "It is readily apparent that under the circumstances and assumptions of this case study, retraining is worthwhile".[80] The main assumptions were (1) "that the incomes of the retrainees would remain relatively constant throughout the remainder of their working lives"; (2) "that all of those who found jobs would remain employed throughout the remainder of the period used in discounting gross benefits"; (3) "that there would be no displacement of workers as a result of retraining"; and (4) "that administrative costs were negligible".[81]

Berman attached high priority among research efforts to an empirical derivation of the relationship between expanding aggregate demand and demands for labour of various skills, and the skill composition of total labour supply. She regarded the Knowles and Kalechek approach (relating occupational unemployment rates to overall rates) as a step in the right direction. Berman tried to assess the significance of diversity in the labour market by comparing the actual record in certain respects with the implications of a model in which such diversity was absent (all members of the labour force were interchangeable). Berman's model considered gross flows of labour force entrants, the recently re-employed, the recently unemployed and the labour force drop-outs.

With monthly gross flow data from 1949 to 1952, and averages of inflows and outflows for selected subsequent years, Berman examined the relationship between the proportion of unemployed out of work fifteen weeks and over and the approximate average probability of failure to leave unemployment in a given month.[82] This probability turned out to be so highly correlated with the unemployment rate that the latter could equally well be used to predict the proportion of long-term unemployed. The observed increase in the proportion of long-term unemployment was thus tentatively explained in part by the increase in total unemployment (the prediction) and in part by a decrease in equality of opportunity (the difference between the actual proportion and that predicted from the relation with total employment).[83]

Simler cited much of the evidence against the structuralist hypothesis produced by the studies described above and then attempted to identify the cause of the increase in long-term unemployment rates.[84] Like Berman, he was concerned with the duration of unemployment. The long-term unemployment rate (fifteen weeks or longer) was related to the national rate for 1947 to 1957 and the resulting equation used to predict long-term unemployment from 1958 to 1963. The fact that underprediction was systematic was regarded as inconclusive because long-term unemployment would be affected by the level of the national rate in previous periods as well. However, allowance for this still yielded an equation which generated systematic under-predictions for the period from 1958 to 1963. This would tend to support the case of the structuralists. Moreover, a significant time trend was found even for the years 1947 to 1957. Simler produced presumptive evidence to the effect that this time variable might be a proxy for the proportion of older (45 and over) workers in the civilian labour force. A similar procedure for very long-term unemployment (twenty-seven weeks or longer) led to essentially the same results. The proportion of oldsters, like the lagged unemployment rate in these calculations, was significant in the statistical sense (the relationship was too well established to be dismissed as coincidence), but of relatively little quantitative significance (indeed it declined in importance after 1957).

It was clear that long and very-long-term unemployment together had risen relatively to long-term unemployment. Simler asked whether or not such increases could be attributable to structural considerations. He theorized that hard core long-term unemployment would develop if the probability of re-employment should decline as the duration of unemployment increased. One reason for such a relationship (absolutely, or relatively) might be that skill levels deteriorated as workers remained unemployed, while wages failed to adapt accordingly. A widening of the gap between the potential productivity of the unemployed and the actual productivity of the unemployed would diminish the probability of re-employment. On this view, the initial cause of unemployment could be a fall in aggregate demand, but *structural* unemployment would subsequently emerge in that fiscal-monetary policy could not reduce unemployment to a desired level without inflation. However, without an expansion in aggregate demand, Simler observed, selective manpower policies could not reduce unemployment at all.

Bowen took the view that the unemployment problem in the United States was a matter for attention both at the aggregate level and at the level of specific groups.[85] He accordingly set out to establish the quantitative dimensions of the unemployment problem. He calculated that a one per cent increase in the aggregate unemployment rate would lead to percentage point increases of 1.8 for non-whites and for male teenagers and 1.5 for female teenagers. Apart from this dominant influence of the overall rate, significant time trends were established over the period 1947 to 1964. The average yearly percentage point increases for the three groups were, respectively, .2, .2, and .3. The trend for non-white teenagers was greater still. Although the evidence was inconclusive, there would seem to be value in considering the relationship between overall unemployment and labour force participation rates. Policy implications are not clear until it can be suggested why it appears increasingly difficult to employ non-whites and teenagers. Gilman's hypothesis on increased enforcement of wage minima and wage equality is relevant here.

In the search for an estimate of the minimum attainable unemployment rate, Denton and Ostry produced for the Economic Council of Canada a review of the structuralist position as advanced by various researchers and an application of their statistical procedures to Canadian data.[86] The limitations of these procedures were evidently recognized by the authors, although there is no expression of skepticism as strong as Lipsey's. We might add to Lipsey's criticism of the dispersion approach that purely structural unemployment, even if the dispersion argument were valid, would produce associated movements between total unemployment and dispersion. Indeed, the total unemployment rate would "account for" all the variations in the dispersion index, but the conclusion that there had been no structural unemployment would, of course, be wrong. Denton and Ostry found that variation in the national unemployment rate explained almost all the variations in the indices of dispersion; in particular, there was no significant trend. Relating sectoral unemployment rates to the national unemployment rate, with allowance for trend, tended to support the structuralist view only in Ontario and Quebec (nationally there was also supporting evidence for male teenagers). There was no indication of underprediction of unemployment rates for manufacturing and construction. The authors noted Solow's suggestion that those displaced from secondary industry might take whatever casual employment they could get in trade or service industries and therefore appear from time to time among the employed in these industries rather than in secondary industry.

When the long-term (four months or more) unemployment rate was related to the national employment rate, with allowance for trend, there was substantial overprediction of long-term unemployment. This is contrary to Simler's results for the United States.

Pierre-Paul Proulx investigated possible increases in concentration by region, industry, occupation, age group and so on, of unemployment in Canada in the postwar period.[87] His methods also paralleled those of U.S. researchers. He found only three changes in the regional composition of unemployment in Canada: (1) British Columbia's share of female unemployment increased; (2) the Atlantic region's share of male unemployment increased slightly; and (3) Quebec males lost out to females somewhat in employment opportunities. Changes in the composition of unemployment by industry, occupation and age group could all be "explained" by variation in the overall unemployment rate.

Measurement of Effect of Technological Change

Brown and de Cani took a fundamentally different approach designed to measure *technological employment.*[88] They developed a method of measuring the effect on employment changes of the following forces—"(a) the scale of output, (b) the relative prices of capital and labor (assuming, for simplicity only two factors), (c) returns to scale, and (d) neutral and non-neutral technology"—and tested it on data for the private domestic non-farm sector of the United States for the period 1890-1958. "Stated differently, our objective is to frame a general method of measurement which permits a quantitative distinction to be drawn between structural changes and demand in terms of their effect on employment."[89] Because this formulation rests on a particular form of production relation between inputs and outputs, a form which is the basis of Professor Kotowitz' study, the theoretical aspects need not be discussed here.

The production function or relation between output and the utilized amounts of labour and capital involved the assumption of a constant elasticity of substitution (a constant ease in substituting labour for capital or vice versa, measured by the percentage response in the employment of capital per unit of labour following a percentage change in the cost of capital relative to the cost of labour). Data for the United States were separated into the sub-periods 1890-1918, 1919-1937 and 1938-1958, on the basis of apparent structural change arising from the impact of technology. In relation to these three periods, the elasticity of substitution and the employment of labour relative to capital at given price ratios seemed to decline and then increase (but the value of neither could be clearly established for the second of the two periods). Other characteristics of production were also estimated. Estimated returns to scale were high in the first two periods but appeared to be decreasing in the third. The speed of adjustment to change seemed to slow down from the first to the second and then hold steady. In effect, a change in employment was attributed by components to various contributing factors: change in output, change in relative prices of labour and capital, and change in technology. Technological change seemed to have a non-neutral effect, that is, it seemed to be of a labour saving sort. There has been considerable research in this general area, the most useful parts of which have been documented in Professor Kotowitz' paper in this volume. The value of such research ultimately will lie in increased understanding of the role of technical change and of the order of magnitude of variation in output or relative factor prices possibly required to maintain full employment in the face of technological change. This area throws no new light on the definitional problem of distinguishing structural from technological unemployment. Changing technology may generate unemployment, but then some criterion such as Lipsey's must be applied. According to this criterion, the same volume of unemployment will be redesignated as deficient demand unemployment (if it can be eliminated by the expansion of aggregate demand without unacceptable rates of inflation), structural unemployment (that part of the remainder the removal of which would be justified on cost-benefit analysis) and frictional unemployment (the remainder).

At least one study of the effects of technological change has taken a different approach: instead of the concept of an aggregate production function being used as the vehicle of analysis, input-output tables were compared for the United States for the years 1947 and 1958.[90] An input-output table is an array of figures showing the distribution of inputs among products and the input requirements of products. Comparison of the United States tables for years mentioned revealed that growth in non-material inputs (energy, communications and so on) are largely balanced by decreases in inputs of materials and semi-finished goods. Moreover, within the class of material inputs there have developed increasing diversification and less reliance upon specific materials for particular uses. Such changes mean that the kinds and numbers of available jobs will also change. Job opportunities grow faster for those who can perform organizational tasks. Analysis based on input-output tables should always be carried out cautiously, however. There is a danger in interpreting observed changes as due to pure shifts in demands or changing technology. There will also have been shifts in relative labour supplies and in relative wage rates—shifts which must be weighed but which cannot be considered separately using this method.

Measurement of Labour Force

In an article on hidden unemployment, Dernburg and Strand took as their starting point some empirical studies showing the response of the labour force to the rate of economic activity.[91] The studies cited, in addition to an earlier one of their own,[92] were by Bowen and Finegan[93] and Tella.[94] These studies, relating to United States data, cannot be reviewed in detail within the limited scope of this chapter. However, the question of labour force participation decisions impinges directly on the level of the aggregate unemployment rate and almost certainly upon various categories of unemployment as well. As the economy falls below full employment, labour force participation declines rapidly at first. This decline in participation rate is subsequently dampened by the inflow of additional workers induced by the unemployment of the "bread-winner".[95]

Dernburg and Strand tried to find out who were the "discouraged" workers and who the "additional" workers, and what quantitative impact unemployment would have for participation rates of such groups. They found the participation rates for males, aged 25 to 64, to be virtually constant, whereas the rates for younger and older males and for all females responded to an increase in the level of employment (positively, except for males aged 55 to 64). They also sought to determine how much more employment would be required (and what would then be the unemployment rates) for each group in order to achieve a 4 per cent overall unemployment rate. In particular, they asked whether or not there had been a *structural shift* in the composition of the labour force which might make it more difficult to reach full employment. On this crucial point they found evidence of a relative rise in participation rates *that would hold at full employment* for labour categories characterized by difficulties in employability (the young because of inadequate training; the old, because of low productivity; and women, because they can no longer legally be paid lower wages than men). Expansion of employment in the neighbourhood of full employment might therefore be becoming increasingly inflationary (that is, more so than if instead there had been an available supply of men in the prime working ages). In other words, the trade-off curve might have deteriorated.

Summary

Estimates of the Phillips curve or the trade-off curve are continually being made for various countries and for differing periods of time. The basic ideas underlying the curves have remained essentially the same throughout this process of refinement of the estimates. Estimation of the trade-off curve is an important tool because it adds to our knowledge of the precise nature of the conflict between policy objectives. Estimates of the magnitude of the shift in the curve in response to particular changes in circumstances similarly increase our understanding of cost-push and structural unemployment. This is the proper framework within which to test for the presence of structural unemployment and to measure the magnitude of structural unemployment.

Most tests for presence and measures of magnitude have, however, been concerned with the structure of the employed and unemployed. Inferences have then been drawn from the evident differential impact of unemployment to the effect that structural rather than cyclical unemployment was showing up. Most studies have found little support for the structuralist view, but Lipsey has demonstrated that it is not possible to test theories of the causes of unemployment by studying the characteristics of the unemployed. His own tests led him to reject the idea of a once-for-all structural shift in the United States around 1957 or 1958. The idea of slowly growing structural unemployment, he argued, is plausible but virtually impossible to test. He did not attempt to measure the magnitude of structural unemployment. On his definition, any such attempt would require estimates of the indifference curves as well as the results of studies of cost-benefit analysis. There has not yet been much application of cost-benefit analysis to selective labour market policies. These studies constitute a key element in the framework appropriate for research on structural unemployment.

Berman spoke of the Knowles and Kalechek approach (relating occupational unemployment rates to overall rates) as a step in the direction which should be assigned top priority in future research efforts. What she had in mind was that if only we knew more about the covariations among demands for labour of various skill levels as aggregate demand increased, we would be better able to detect the partial impact of structural unemployment. This would certainly be true, but of course we could only be certain that actual experience shed clear light on the issue if we could also be certain that structural unemployment had been totally out of the picture over the period under consideration. Berman and Simler found evidence of increased duration of employment, due in part to increasing compartmentalization of the labour market and possibly a relative deterioration in the productivity of those long employed. Either reason would require treatment other than expansion of aggregate demand and would therefore be considered structural.

Under certain assumptions it is possible to measure the apparent impact upon employment (and unemployment) of such interrelated factors as technological change, returns to scale and relative costs of labour and capital. An illustration of such a study has been provided in order to show how technological unemployment might arise. Viewed from the basis of expected cures, technological unemployment might also be structural. The shortcoming of this approach is that it assumes the supply of labour to be undifferentiated and unlimited at the going real wage rate, up to full employment. Estimation of such aggregative production functions, however, can be of great help in understanding the process of technological change and the related impact upon the demand for labour.

Dernburg and Strand found some evidence in the behaviour of labour force participation rates to suggest that changes might adversely affect the trade-off curve.[96] They emphasized, however, that there still remained ample scope for aggregative demand policies.

In sum, then, the empirical studies here reported illustrate the research framework employed so far. The essential elements are estimation of the trade-off curve; a search for increased dispersion in rates of wages or unemployment, or both; a search for variation in demand for skilled versus unskilled workers over the course of the cycle; and estimation of the impact of technological change and analysis of participation rates. A complete framework would fit most of these pieces together within Lipsey's construction for analysis of structural unemployment.

VII POLICY CONCLUSIONS

Policies Affecting Aggregate Demand Are Most Important

Canada, like the United States and other countries, is committed to a national full employment policy. The commitment originated in the early postwar years with general acceptance of the Keynesian analysis of the determination of cyclical unemployment. It was only with the onset of persistently higher levels of employment after 1960 (while inflation persisted) that the issue of "structural" versus "deficient aggregate demand" unemployment came into its own. Economists have argued that the structuralist contention is spurious in relation to Canadian experience. Professor Hood traced the difficulty to a decline in the rate of growth of our exports of raw and semi-finished materials and a decline in the rate of growth of our population, the two strongest sources of expansion in demand in the postwar period.[97] In this he found a parallel with experience in the United States, in that the rate of growth in demand for output had declined generally throughout North America. He specifically rejected several alternative hypotheses which had gained currency, to the effect that our difficulties had their source in an increased propensity to import, or living beyond our means, or disparate geographical or industrial growth rates. Professors Harry Johnson,[98] and Clarence Barber[99] also maintained that inadequate aggregate demand was the proximate cause of unemployment but attributed the blame for it in large part to perversely restrictive monetary policy and the consequent support of the premium on the Canadian dollar. Similar analyses have been produced to explain the experience in the United States.[100] This analysis implies partial abandonment of the full employment policies.

The policy goal of full employment as it has evolved over the postwar period has been reviewed by R. A. Gordon.[101] He found that European countries had characteristically set their sights higher than Canada or the United States and that this differential in target values appeared to have widened over the years because Europeans had aimed at even higher rates of employment while Canadians and Americans decided to settle for lower rates. These developments appeared to reflect a higher priority among North American policy makers for such other considerations as a balanced budget, the maintenance of stable prices and maintenance of balance of payments equilibrium without reliance upon variation in the exchange rate. At the same time, there appeared to be growing interest in manpower policies designed to reduce the differentials among unemployment rates for various age, colour, educational, occupational and regional groups within the United States; and a similar interest developed in Canada. It was argued that such policies were desirable both on grounds of equity and on grounds of efficiency, in that they were believed to be at least partly responsible for the superior performance of European nations where virtually the only pockets of above average unemployment were regional. The exceptions were the unskilled in the United Kingdom, teenagers in France and Sweden, and older age groups in Belgium, Sweden and the United Kingdom.[102]

Modern employment theory has significantly elaborated the revolutionary Keynesian formulation in the light of experience, particularly the experience of living in an open economy dependent upon international trade. The rate of economic growth has emerged as a goal of aggregative economic policy. Whether price stability, balance of payments equilibrium and incomes policy be regarded as additional goals—as they usually are—or as constraints—as Professor Gordon would prefer to put it—is important only insofar as the point of view may help to clarify the issues involved.[103] However we may choose to speak of these interrelated considerations, the point is that it is impossible to satisfactorily define full employment—let alone achieve it—except in the context of these other goals and constraints.

These difficulties are at least as great in trying to define and remedy structural unemployment. Indeed, complexities are compounded because the identification of changes in structural unemployment, defined in any of the usual ways, would modify the full employment target value at least in the short run.[104] Structural unemployment (in the sense that application of the remedy of stimulation of aggregate demand would produce intolerable side effects in the form of inflation and balance of payments disequilibrium), even if believed to be increasing, should be lived with in the short run until suitable manpower policies to help out can be implemented. Gordon argued that this structuralist view had been influential in Congress and perhaps in the Federal Reserve but not in either the Kennedy or Johnson administrations, for which the target of no more than 4 per cent aggregate unemployment was still official policy.[105] The absolute upper limit for any appreciable length of time he believed to be between 6 and 7 per cent.[106] It is not clear what target value or upper limit has characterized Canadian policy, although some investigation of this question has been carried out along rather different lines by Grant Reuber.[107]

The Role of Selective Labour Market Policies

Policies designed to regulate aggregate demand are of paramount importance in combating unemployment. To the extent that real structural difficulties exist, it may pay to supplement these general instruments of monetary and fiscal policy with selective labour market policies, in order to come closer to full employment without creating excessive rates of inflation. Clearly these two types of policies are not alternatives. They belong together. Each makes the other more effective. Without the right kind of aggregative policy, selective labour market policies will at best just shift unemployment from one group of labourers to another (instead of reducing overall unemployment).[108] This might result in a redistribution of unemployment which could be considered more equitable in some sense.[109]

The question of whether or not it pays to implement selective labour market policies can be answered only when aggregative demand policies have already carried the economy to such a high level of employment that to go further would involve excessive rates of inflation. Unless aggregate demand is adequate, in this sense, there is no point in posing the question because it cannot possibly be answered: the costs and benefits cannot be adequately assessed.[110] When the analysis of selective manpower proposals (carried out in this full employment context) shows that implementation would pay, it will still be true that aggregative demand policies are of paramount importance. Without an expansion in aggregative demand, it is most unlikely that new jobs will be created.

This complementary, or mutually reinforcing, relationship between these types of policies is generally acknowledged. Differences of opinion begin to emerge when the question turns to estimating just how much good can be expected of selective manpower policies in general, and just which specific forms of such policies offer the greatest prospect of net benefit. Specifically, it may be argued that effective labour exchanges be developed or that mobility be encouraged by subsidization of retraining and the costs of moving from job to job.

Retraining programs of course increase overall mobility in a special sense; the effort is designed to increase the employability of the workers by increasing their productivity. This way of looking at it has the advantage that the workers involved may be viewed as those "left behind" by an expansion of aggregate demand, in the sense that it failed to restore their productivity. These are the workers in chronically distressed industries, industries which have lost defense contracts, or industries characterized by technological replacement of workers.[111] Some would feel that care should be taken to avoid institutional arrangements that might inhibit mobility and efforts directed toward the removal of such cumbersome features as have already developed. Illustrations would be the avoidance of pension rights and seniority provisions designed to tie workers to particular firms, and the assurance that workers receiving benefits under unemployment insurance plans be not only "out of work" but also "looking for jobs" in some reasonable sense.[112]

A fairly obvious approach to the problem of structural unemployment is relocation of industry. The result is the direct mopping up of the pockets of structural unemployment. However, from the cost-benefit point of view, it is not at all clear that this direct, and therefore attractive, approach is really the best. Policies designed rather to increase mobility offer a price-stabilizing effect and alleviation of structural unemployment, together with an increase in efficiency which has a cumulative benefit over time and must eventually tip the scale in favour of adoption—at least so long as economic, rather than political, costs and returns are considered.[113] From the economic point of view, it usually pays to relocate the labour rather than to relocate the industry. That is why labour mobility is so important. Full employment is in a sense, therefore, doubly important, because labour mobility is increased by favourable alternative-employment opportunities.

The question of wage flexibility is at the core of the mobility issue, the structural unemployment problem and the need for reconciliation between policy objectives portrayed by the trade-off curve.[114] Selective manpower policies rarely meet this question head-on. This may well be why some economists take a skeptical view of the potential contribution of such policies, or at any rate seek to emphasize that there is no easy way out of the trade-off dilemma.[115] Increases in union or legal minimum wages can create structural unemployment and/or make it more difficult to eliminate structural unemployment created by other factors, such as changes in technology and population.[116] Among the more obvious policies designed to improve the trade-offs and reduce structural unemployment would be (1) the development of unionism which is responsible in the sense of being prepared to exercise wage restraint in situations in which restraint all-round would seem to be in the general interest, and (2) a reduction in the scope of administered wages.[117]

The importance of wage flexibility and, more generally, the struggle for an increased share of national income (higher wages or higher profits) through the mechanism of administered wages and administered prices, have focused attention upon "guide lines", or even national wage or incomes-policies. Many economists, as well as unionists, would be inclined to object to interferences in free collective bargaining. More importantly, however, the record shows that wage guide line policies and national income policies collapse sooner or later because of uncontrolled inflationary pressure in sectors not unionized or not occupied by big business.[118] In point of fact, also, it is by no means clear just how a wage policy should be defined. The problem is to keep real wage rates (and other rates of reward to productive factors) in such a relation to each other as to effectively bring about the same result—as far as the pattern of production and employment is concerned—as if these rates had been free to vary in response to market forces in an "ideal" economy (in the sense that there was full employment without inflation).[119]

The Economic Council of Canada places great emphasis upon selective manpower or labour market policies. In the *Second Annual Review* the Council recommended:

(1) The establishment of an effective administration;
(2) expansion of programs for training and retraining;
(3) more adequate labour market information;
(4) effective programs of assistance to promote mobility; and
(5) steps to cope with manpower shortages.[120]

The *Review* stressed the complementarity of "employment policy" and "manpower policy" and asserted (without offering evidence) that policies of the latter sort could be justified in terms of cost-benefit analysis. The *Third Annual Review* reports on two excellent research papers of direct relevance to this chapter. One of these, dealing with the conflict between price stability and full employment, has been referred to in the discussion of the trade-off curves in section III.[121] The second, prepared by Professor David C. Smith, is entitled *Incomes Policies: Some Foreign Experiences and Their Relevance for Canada.* In the *Review* the main arguments for and against incomes policy are summarized and appraised with respect to applicability in Canada. The Council adopted the view that "Canada is very far indeed from being a favourable environment for incomes policy".[122] The reasons given were divisions of jurisdiction between levels of government (particularly in the field of labour relations); the implausibility of being able to resort to direct wage and price controls; a labour movement unsuitably structured for observance of guide lines; powerless employer organizations; and regional differences in the characteristics of the economy.

Thus the Council has recommended against an incomes policy and has opted for "the essentials of the institutions of free collective bargaining and of flexible and relatively decentralized determination of wages and prices".[123] The basic importance of appropriate monetary and fiscal policies was reiterated. In addition, complementary policies were advocated; for some of these the impact would be directly related to the price performance of the economy, while for others the impact would be indirect. The direct policies are similar to the selective manpower policies already discussed here. The indirect apply to research, statistics, information and education.

Framework for Future Research

In summary, the consensus is that monetary and fiscal policies to expand effective demand and selective manpower policies to improve efficiency of the labour market are largely complementary. The optimal mix of these broad policy types at full employment to maintain full employment will depend upon the costs and benefits of selective manpower policies. Much more analysis is required to determine these costs and benefits adequately, for many questions are as yet unanswered. The greatest of such questions relates to the extent to which such policies should be directed toward training, retraining and relocation, on the one hand, and the promotion of wage flexibility, on the other. There would seem to be very little merit in a comparison of the number of unemployed with the number of unfilled jobs without regard to rates of remuneration. It is always possible to create a shortage or a surplus by establishment of an unsuitable price. It has been observed that there are very real limitations on the feasibility of price and wage flexibility as a policy proposal, but the fundamental principle cannot, of course, be denied.

Thorough reconsideration of the basic principles governing the distribution of society's ouput among its members may be required to bring economic analysis to grips with the emerging realities of an automated economy. While admitting that minimum wage laws may have contributed to the difficulty of achieving full employment without unacceptably high rates of inflation, it should also be admitted that such laws are here to stay and that, indeed, the principle is likely to be reinforced by demands for a guaranteed minimum annual income designed to eliminate "poverty". If such programs were put into effect, there would surely be a deepening of the structural problem. The only alternatives would seem to be either to accept the principle of paying some people for doing nothing (for which there has already been some precedent in programs of agricultural support), or to create opportunities in the social sector for individuals to make productive contributions in line with social remuneration for those individuals the value of whose productive contributions in the private sector do not measure up. This suggestion does not imply a return to the concept of the poorhouse; the intention is rather that there be an appropriate expansion of the social sector of the economy (based on something more imaginative than the leaf-raking classics of odious repute), perhaps along the lines of Galbraith's recommendations in *The Affluent Society*. The basis for such programs would not, however, be the disappearance of scarcity as such, but the social determination to radically alter the distribution of income that would otherwise be required to attain a fully employed economy. In line with Galbraith's thesis, it could be argued that the loss of efficiency (at least by the standards of the market place) could well be borne by a wealthy economy. The greater evil would be to sacrifice the exciting prospects for productivity gains at rates perhaps exceeding the greatest yet known, by measures based on a myopic fear of the apparent job-destroying consequences of the adoption of new technologies, automation included.

At the more prosaic level of testing for evidence of structural change, the best analytic tool is the Phillips or trade-off curve. Effort should still be directed at estimation of various formulations of this basic relationship in an attempt to capture and assign causes for significant shifts over time. Further research is also required on the (possibly changing) state of social attitudes toward trading-off unemployment for inflation. It is difficult to see how selective manpower policies could be adequately evaluated by a cost-benefit analysis, unless that analysis took specifically into account the nature and magnitude of the shifts in the trade-off curve expected to be associated with the implementation of particular versions of these policies. Measurement of structural unemployment requires knowledge of the trade-off curve, the relative costs of inflation and unemployment under various circumstances, and the evaluation of these costs by the authorities, as well as the ranking of selective manpower policies by cost-benefit analysis.

This suggested framework echoes Lipsey's proposal for further research, which would incorporate the trade-off curve's structural information on ceilings and floors in a more complete model.[124] The eclectic approach may well be best. We should probably try to build a model incorporating the structural characteristics for which various researchers seem to have produced some evidence and then to examine the behaviour of such a system by simulation studies. If we were to heed Lipsey's observation that a complete model should take account of the way in which the central fiscal and monetary authorities might be expected to respond to changing circumstances, we could examine within the context of simulated behaviour of the entire system the actual behavioural rules apparently followed in the past (as estimated by Reuber and others) and various alternative rules that might be considered preferable.

Summary

Policies of aggregate demand remain of paramount importance in the regulation of the level of economic activity and the control of the level of employment. As aggregate demand expands in response to general monetary and fiscal policies, unemployment begins to melt away as the economy warms up. The hard-core unemployment is not so easily disposed of, however, and the economy would become overheated in trying to get rid of it in this way. The extent to which the inflationary fires would have to be fanned is indicated by the trade-off curve. As unemployment is reduced by the expansion of aggregate demand, this curve indicates at each step along the way just how much price stability has to be sacrificed or traded-off to secure a further reduction in unemployment. The trade-off cure dramatizes the conflict between policy objectives in a modern economy: full employment and price stability are both sought after, but the attainment of either is inhibited by realization of the other.

The conflict between policy objectives means that a choice must be made. The monetary and fiscal authorities must set the thermostat of economic policy so as to constrain the rate of inflation to an acceptable rate. The rate of inflation considered acceptable may vary in response to changing circumstances. Associated with the acceptable rate of inflation will be an acceptable rate of unemployment; indeed, the two will be determined together within the broadest possible context of considerations of economic policy.

Acceptable rates of inflation and unemployment should be regarded as the best of all possible rates, given the fact that both rates cannot simultaneously be zero (that is, there cannot be price stability and full employment at the same time). Attainment of these best of all possible rates may depend upon implementation of selective labour market policies. These policies do not much affect aggregate demand; their impact is essentially upon the supply side. They may be viewed as shifting the trade-off curve so that even lower rates of inflation and unemployment may be attained together. Implementation of selective labour market policies is contingent upon the benefits of such proposals exceeding their costs.

Structural unemployment is best understood in terms of this policy-oriented framework. If at any time there should happen to be selective labour market policies not yet implemented, for which the costs of implementation could be justified by the benefits to be secured, the economy would not be operating as efficiently as it could (even though aggregate demand had been expanded to a point beyond which rates of inflation would be regarded as unacceptably high). The amount by which unemployment could be further reduced by implementation of such net beneficial selective labour market policies (and appropriate complementary expansion of aggregate demand up to the point at which unacceptably high rates of inflation would then be encountered) would be the amount of structural unemployment.

Measurement of structural unemployment as such is not a matter of much importance. This is not the same thing as saying that structural unemployment as such has not been a matter of much practical importance in our experience, although the evidence seems to indicate that this is also true. Measurement of structural unemployment is unimportant even as a matter of principle. In order to measure structural unemployment, it is necessary to estimate the trade-off curve, to estimate the probable reactions of the authorities to the alternatives before them and to estimate the potential for net beneficial implementation of selective manpower policies.

A framework for research should consist of these three areas, but not in order to measure structural unemployment. The agitation over measurement of structural unemployment seems to have been based, in part, upon the implicit understanding that, if it could be shown that non-cyclical unemployment was important and growing, it would automatically follow that any way of getting rid of it would be justified. Lipsey has set the record straight by emphasizing that care should be taken to determine that special efforts really do pay. In contrast with the view that it pays to get rid of "structural" (non-cyclical) unemployment, there is Lipsey's definition of "structural" as that unemployment (non-cyclical) which it pays to get rid of.

A framework for research should include estimation of the trade-off curve, and possible shifts in it arising from proposals for selective labour market policies, in order that monetary and fiscal authorities be made aware of the alternatives before us. The framework should also include estimation of the economic and political costs of inflation, unemployment and selective labour market policies, in order that monetary and fiscal authorities be able to arrive at the best of all possible rates of inflation and unemployment, given their knowledge of the alternatives before us. Finally, the framework should emphasize the need for cost-benefit analysis of all proposals for selective labour market policies, in order that the alternatives before us be made as realistically attractive as possible.

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[2] Samuelson, P. A. and Scott, A., *Economics: An Introductory Analysis*, Canadian edition, McGraw-Hill, Toronto, 1966, p. 15.

[3] See Professor Kruger's paper for a more complete discussion.

[4] Johnson, Harry G., "Employment Theory and Public Policy in the North American Context", McGill University Industrial Relations Centre, Fifteenth Annual Conference, *Employment, Unemployment and Manpower*, June 8 and 9, 1964, pp. 93-112.

[5] Professor Hollander's paper deals with the classical economists.

[6] In the short run inventories may be run down instead, but production will subsequently increase if the increase in demand persists.

[7] The Third Annual Review of the Economic Council of Canada focuses attention on the issues raised in this and the following sections.

[8] The Phillips curve derives from the study of these relations by Phillips, A. W., "The Relation Between Unemployment and the Rate of Change in Money Wage Rates in the United Kingdom, 1862-1957", *Economica*, November 1958, No. 25, pp. 283-299.

[9] Economic Council of Canada, *Third Annual Review*, Queen's Printer, Ottawa, 1966. Economic Council of Canada, Reuber, G. L., Bodkin, R. A., Bond, Mrs. E. P. and Robinson, T. R., *Price Stability and High Employment: the Options for Canadian Economic Policy.*

[10] U.S. Congress, Joint Economic Committee, *Employment and Unemployment*, hearings before the Subcommittee on Economic Statistics, December 18, 19, 20, 1961, p. 352.

[11] For another view on the mismatching question, see Professor Kruger's paper.

[12] Economic Council of Canada, *First Annual Review*, Queen's Printer, Ottawa, 1964. Brown, T. Merritt, *Canadian Economic Growth.*

[13] Fukuoka, Masao, "Full Employment and Constant Coefficients of Production", *Quarterly Journal of Economics*, February 1955, No. 69, p. 24.

[14] See the paper by Professor Hollander.

[15] The elasticity of substitution is the percentage change in the rate of employment of labour per unit of capital in response to a percentage change in the cost of capital relative to the cost of labour.

[16] Gordon, R. A., "Full Employment as a Policy Goal" in Ross, A. (ed.), "Has Structural Unemployment Worsened", *Industrial Relations*, May 1964, No. 3, pp. 53-77.

[17] A social welfare function is a specific view of how various factors affect the public good.

[18] U.S. Congress, Joint Economic Committee, *Employment and Unemployment*, hearings before the Subcommittee on Economic Statistics, *op. cit.*, p. 356.

[19] Demsetz, Harold, "Structural Unemployment: A Reconsideration of the Evidence and the Theory", *Journal of Law and Economics*, pp. 80-92.

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[24] Rees, Albert, "The Dimensions of the Employment Problem Now and for the Foreseeable Future", Proceedings of a Symposium on Employment, American Bankers Association, 1964, p. 24.

[25] Lipsey, R. G., "Structural and Deficient Demand Unemployment Reconsidered" in Ross, A. (ed.), *Employment Policy and the Labor Market*, *op. cit.*, pp. 210-285.

[26] Lipsey, R. G., *op. cit.*, p. 216.

[27] For one reason or another, various economists have argued that structural unemployment is not independent of cyclical unemployment. Brown has alluded to the mutually reinforcing interaction of the two. Reynolds has emphasized the relation between tolerance for inflation and the increase in the level of unemployment which he would, however, prefer not to speak of as structural. Professor Clarence Long holds that an upward pressure of structural changes on unemployment has sometimes been checked by heavy aggregate demand, at other times released by declines in the rate of growth of demand (see U.S. Congress, Joint Economic Committee, *Employment and Unemployment, op. cit.*, pp. 349-350).
Lipsey stated "(a) that a structural shift can permanently affect the level of aggregate demand associated with a particular level of income by redistributing income between groups with different savings propensities, and (b) that a structural shift can set up cyclical swings in aggregate demand and income by redistributing income between groups with different lags in their consumption function" ("Structural and Deficient Demand Unemployment Reconsidered", *op. cit.*, p. 249).

[28] Phillips, A. W., *op. cit.*

[29] The labour force participation rate is the proportion of the working-age population represented by those employed plus those looking for work.

[30] There were exceptionally high rates of increase in import prices in 1937 and in inflationary agricultural policies in 1935 and 1936. The geographical factor was operative during the upswing between 1934 and 1937. Wage constraint policy was influential during 1949. The period 1948 to 1957 appeared to have been characterized by the slow-down. Phillips, A. W., *op. cit.*, p. 252.

[31] Samuelson, P. A. and Solow, R. M., "Analytical Aspects of Anti-Inflation Policy", *American Economic Review*. May 1960, p. 381.

[32] Lipsey, R. G., *op. cit.*, p. 211.

[33] *Ibid.*, p. 213.

[34] *Ibid.*, p. 215.

[35] Klein, Lawrence R. and Bodkin, Ronald G., "Empirical Aspects of the Trade-Offs among Three Goals: High Level Employment, Price Stability, and Economic Growth" (Research Study Seven for the Commission on Money and Credit), in *Inflation, Growth, and Employment*, Prentice-Hall, Englewood Cliffs, 1964, pp. 367-428.

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[38] Bowen, W. G. and Harbison, Frederick H. (eds.), *Unemployment in a Prosperous Economy*, a report of the Princeton Manpower Symposium, Princeton, May 13-14, 1965. Professor Kruger explains this further.

[39] Samuelson, P. A. and Solow, R. M., "Analytical Aspects of Anti-Inflation Policy", *op. cit.*, p. 382.

[40] *Ibid.*

[41] It has been argued by some that the unusually high rates of price increase, given the level of unemployment, have been more apparent than real. The basis for this contention is the view that the indices of price change are substantially biased in the direction of exaggerating increases, primarily because of a neglect of improvements in the quality of goods and services. It should be noted that for this argument, however valid, to provide an explanation for the rightward shift in the Phillips or trade-off curve which is implicit in the thinking of the structuralists would require that the degree of such bias be accelerating. The notion of acceleration in the rate of increase of quality of goods and services will not find ready acceptance by the cynics who seem to find increasing evidence in day-by-day personal experience of deterioration in quality, in the form of increased frequency of repairs on new durable goods, increased delay and reduced satisfaction in servicing of those durable goods, and the virtual disappearance of civility by those who deal with the public in any way. The definition and measurement of quality is not an easy matter in the aggregate, and it seems unwise to place much reliance on this particular approach to an explanation of higher rates of inflation at given levels of aggregate unemployment.

[42] Reder, Melvin W., "The Theoretical Problem of a National Wage-Price Policy", *Canadian Journal of Economics*, February 1948, No. 14, pp. 46-61.

[43] *Ibid.*, p. 53.

[44] *Ibid.*, p. 55.

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[48] Drawn from an excellent summary by Professor Harry Johnson, *ibid.*

[49] Hicks, J. R., "Economic Foundations of Wage-Policy", *Economics Journal*, September 1955, No. 65, pp. 389-404.

[50] *Ibid.*, p. 399.

[51] Reder, Melvin W., "Wage Structure and Structural Unemployment", *The Review of Economic Studies*, Vol. XXXI, (4), No. 88, October 1964, pp. 309-322.

[52] See Professor Hollander's article concerning wage and employment determination among the unskilled.

[53] *Labor Mobility and Economic Opportunity*, The Technology Press of Massachusetts Institute of Technology and Wiley, New York, 1954. Essays by—

E. Wight Bakke
Philip M. Hauser
Gladys L. Palmer
Charles A. Myers
Dale Yoder
Clark Kerr

preface by Paul Webbink.

[54] "Such data, however, available for the United States and a few other countries, hardly justify firm generalization at this time. All the data may be regarded as representing samples drawn from Western countries in approximately the same state of the 'demographic revolution' and industralization. The total labor force participation rate is the net effect not only of changing specific rates by age and sex but also of other basic changes, social and economic, including shifts in urban-rural residence, declining fertility and mobility rates, an aging population, fluctuating marriage rates, changes in retirement practices, increase in and prolonged school attendance, changing size of family, changing role of women, increased productivity, decreased hours of work, increased real income, technological changes, and changing provisions for various forms of security". *Labor Mobility and Economic Opportunity*, *ibid.*, pp. 17-18.

[55] "Such institutional rules are established by employers' associations, by the informal understandings of employers among each other (the 'gentlemen's agreement'), by companies when they set up their personnel policies, by trade unions, by collective agreements, and by actions of government. They contrast with the independent preferences of the individuals who are directly involved". *Labor Mobility and Economic Opportunity*, *ibid.*, p. 93.

[56] *Ibid.*, p. 108.

[57] Gilman, Harry J., "Economic Discrimination and Unemployment", *op. cit.*

[58] Gallaway, L. E., "Labor Mobility, Resource Allocation, and Structural Unemployment", *American Economic Review*, September 1963, No. 53, pp. 694-716.

[59] *Ibid.*, p. 695.

[60] Lipsey, R. G., *op. cit.*

[61] Reuber, G. L., Bodkin, R. A., Bond, Mrs. E. P. and Robinson, T. R., *op. cit.*

[62] Economic Council of Canada, *op. cit.*

[63] Demsetz, Harold, "Structural Unemployment: A Reconsideration of the Evidence and the Theory", *Journal of Law and Economics*, *op. cit.*

[64] *Ibid.*, p. 86.

[65] *Ibid.*, p. 88.

[66] Gallaway, L. E., "Reply 531, Stoikov, Vladimir—Structure of Unemployment: Comment, 527", *American Economic Review*, June 1965.

[67] Vladimir Stoikov criticized Gallaway's statistical test on the ground that it would not distinguish alterations in the distribution of unemployment. Gallaway had chosen not to follow the method of the Joint Economic Committee which consisted of relating sectoral unemployment rates to the total unemployment rate and time, because it required judgement as to a meaningful number of sectors in which the time variable was a significant factor. Gallaway proposed and used a measure of the correlation among sectoral unemployment rates. Stoikov argued that this was not the same as a measure of dispersion of unemployment rates and that changes in the measure therefore could not be taken to imply changes in the distribution of unemployment rates. He constructed a counter-example in which sectoral unemployment rates were perfectly correlated within separate periods of time but in which the sectoral distribution of unemployment rates change from one period to the other (the lowest rate was decreased, the highest increased). Stoikov suggested the use of an alternative measure or index of dis-

persion:variance (but used standard deviation in deference to Gallaway's contention that this would make better theoretical sense on certain assumptions). Stoikov's calculations yielded estimates of the relation between this alternative measure (calculated for sectoral unemployment rates) and the aggregate unemployment rate (to eliminate the effect of the cycle) for the years 1957 to 1960 and for the pre-1957 period. The effect on the dispersion index of the aggregate unemployment rate was almost identical (.506 instead of .503) in the later period, but the implied value of the index in the event of no dispersion at all had increased (from –.182 to –.052). Stoikov concluded that there was some suggestion in this latter fact of a small upward shift in dispersion and that Gallaway's strong conclusion of the absence of increased dispersion did not appear warranted. In reply, Gallaway accepted the validity of Stoikov's argument by counter-example but said the point was not relevant when correlations were based on changes in rates (rather than the rates themselves), as they were in his study. Gallaway then proceeded to construct another counter-example which was insensitive to his own test but sensitive to Stoikov's. However, he claimed it involved a slightly different concept of structural change than that for which he had tested, in that it assumed that structural unemployment had been accumulating in a specific sector throughout both periods. Finally, Gallaway rejected Stoikov's numerical results, because it made no sense for the dispersion index to be other than zero should there be no dispersion at all, and because, indeed, the apparently non-zero values could be attributed to chance. He therefore concluded that Stoikov's calculations, properly interpreted, supported his own conclusion that there was no evidence of increased dispersion (and presumably, therefore, no evidence of increased structural unemployment).

[68] Lipsey, R. G., *op. cit.*

[69] He cited the view expressed by Professor Gordon to the effect that most studies had demonstrated the relative unimportance of structural changes (Gordon, R. A., "Has Structural Unemployment Worsened", *op. cit.*) and then proceeded to evaluate the five references cited by Gordon: Kalachek and Knowles (Subcommittee on Economic Statistics of the U.S. Congress, Joint Economic Committee, *Higher Unemployment Rates, 1957-60; Structural Transformation or Inadequate Demand*, Washington, 1961), Heller ("The Administration's Fiscal Policy", in Ross, A. (ed.), *op. cit.*, pp. 93-115), Eckstein ("Aggregate Demand and the Current Unemployment Problem" in Ross, A. (ed.), *op. cit.*, pp. 116-134), Gallaway ("Reply 131", *op. cit.*)

and Appendix A of the 1964 Economic Report of the President (Economic Report of the President, 1964, Appendix A).

[70] Knowles and Kalachek, *op. cit.*

[71] Lipsey, R. G., *op. cit.*

[72] *Ibid.*, p. 232.

[73] *Ibid.*, p. 235.

[74] *Ibid.*, p. 247.

[75] *Ibid.*, pp. 224-226.

[76] The pitfalls in the path of the unwary or casual pursuer of a distinction between these alternative explanations have been lucidly summarized by Professor Harry Johnson:

> Since a decline in demand is never spread evenly over the different industries, and since recent investment will have been undertaken in the expectation that the economy would continue to grow at its accustomed rate, it will be plausible to argue that unemployment is due to structural maladjustments of the economy and the errors of past investment decisions. Since skilled and educated employees are both more worth retention on a standby basis to their employers and more adaptable to alternative occupations, unemployment will be concentrated on the unskilled and the illiterate, and it will be plausible to argue that unemployment is due to insufficient education of the population. Since firms are likely to hold on to labour made redundant by labour-saving improvements when the labour market is tight and to discharge it when the labour market is easy, it will be plausible to attribute unemployment to labour-saving inventions and automation.
>
> There is no reason why structural unemployment should not give rise to the same characteristic mix among the unemployed as would occur with deficient-demand unemployment. The only difference would be that with structural unemployment the mix of the *employed* would represent the mix at which new labour would be taken on as production increased, while this is not so with deficient-demand unemployment.
>
> It will also appear plausible to argue, quite fallaciously, that because firms are employing excess labour for the reasons just given an expansion of demand will not increase employment, when the correct inference is, of course, that demand needs to be expanded more than would appear necessary at first sight. Thus all sorts of explanations of unemployment will be advanced other than the fundamental one, the inappropriate monetary policy of the central bank . . . .

"Employment Theory and Public Policy in the North American Context", *op. cit.*, p. 147.

[77] Lipsey, R. G., *op. cit.*, p. 251.

[78] Professor Drummond's paper discusses cost-benefit analysis.

[79] Page, David A., "Retraining under the Manpower Development Act: A Cost-Benefit Analysis", Reprint No. 86 of the Brookings Institution, Washington.

[80] *Ibid.*, p. 267.

[81] *Ibid.*, pp. 265-267.

[82] Berman assumed that the unemployed found jobs or left the labour force as a matter of chance. The ratio of the total gross flow out of unemployment (to other statuses) during any period of time to the number of unemployed persons one period earlier was taken as the individual's chance in that earlier period of getting out of unemployment by the following period.

Using unpublished data provided by the U.S. Department of Labor, Bureau of Labor Statistics, corrected for certain biases according to a procedure attributed to Altman (Altman, Stuart, "Effects of Inter-Labor-Force Mobility in the Unemployment and Labor Supply of Married Women", in *Proceedings of the Business and Economic Statistics Section*, American Statistical Association, 1963), Berman calculated such chances (probabilities) from which she derived the proportion of total unemployed during various periods who could be expected (on the basis of these probabilities) to have been unemployed for certain specified durations. Comparison of the predicted distribution of duration of unemployment with the actual distribution revealed such differences as to demonstrate that in fact it could not be "true that in any period all of the unemployed white males have the same chance of leaving unemployment". (Berman, B., "An Approach to an Absolute Measure of Structural Unemployment", *op. cit.*, p. 264.) The chance of the skilled to leave unemployment in any period would presumably be greater than for the unskilled. These relative probabilities, Berman suggested, would depend upon the extent of aggregate unemployment and could only be taken as a good measure of structural unemployment if the economy should already be at the bottleneck of *full employment of the skilled*. It is difficult to understand what can be meant by the "transition probability of skilled" workers (the probability of leaving unemployment) in a situation in which the skilled are all employed, unless Berman intends us to regard this probability as essentially unity. By the same token, with the skilled fully employed there is no chance of employment for the unskilled in Berman's model (for she assumes that the level of output determines that a *fixed number* of unskilled are employable per skilled worker and not worth employing alone).

Therefore, at the point of bottleneck, the average chance of leaving unemployment would appear to be unity for the skilled and zero for the unskilled, and presumably neither average makes sense unless it holds for all individuals in the group.

[83] Berman, B., "An Approach to an Absolute Measure of Structural Unemployment" in Ross, A. (ed.), *Employment Policy and the Labour Market, op. cit.*, p. 268.

[84] Simler, N. J., *op. cit.*

[85] Paish, F. W., "Studies in an Inflationary Economy", Macmillan, 1962.

[86] Denton, F. and Ostry, S., *An Analysis of Post-War Unemployment* for Economic Council of Canada, Staff Paper No. 3.

[87] Proulx, Pierre-Paul, "The Composition of Unemployment in Canada", McGill University Industrial Relations Centre, Fifteenth Annual Conference, *Employment, Unemployment and Manpower*, June 8 and 9, 1964, pp. 36-54. Also see "Chomâge Structurel et Politique Economique", *Relations Industrielles* (Laval), u. 21, 1966, No. 2.

[88] Brown, Murray and de Cani, John S., "A Measure of Technological Employment", *The Review of Economics and Statistics*, Vol. XLV, No. 4, November 1963, pp. 386-394.

[89] *Ibid.*, p. 386.

[90] Carter, Anne P., "The Economics of Technological Change", *Scientific American*, Vol. 214, No. 4, April 1966, pp. 25-31.

[91] Dernburg, Thomas and Strand, Kenneth, "Hidden Unemployment 1953-62: A Quantitive Analysis by Age and Sex", *American Economic Review*, Vol. LVI, No. 1, March 1966, pp. 71-95.

[92] Strand, Kenneth and Dernburg, Thomas, "Cyclical Variation in Civilian Labor Force Participation", *The Review of Economics and Statistics*, November 1964, No. 46, pp. 378-391.

[93] Bowen, W. G. and Finegan, T. A., "Labor Force Participation and Unemployment", in Ross, A. (ed.), *Employment Policy and the Labor Market, op. cit.*, pp. 115-161.

[94] Tella, A., "The Relation of Labor Force to Employment", *Industrial Labour Relations Review*, No. 17, April 1964, pp. 454-469. Tella, A., "Labor Force Sensitivity to Employment by Age, Sex", *Industrial Relations*, February 1965, No. 4, pp. 69-83.

[95] Dernburg, Thomas and Strand, Kenneth, *op. cit.*, p. 71.

[96] *Ibid.*

[97] Hood, W. C., "The Decline in the Rate of Economic Growth" in Watkins, M. H. and Forster, D. F. (eds.), *Economics: Canada*, McGraw-Hill, Toronto, 1963, p. 142.

[98] Johnson, Harry G., "Monetary Policy and Stagnation in the

Canadian Economy", in Watkins, M. H. and Forster, D. F. (eds.), *ibid.*

[99] Barber, C. L., "Austerity 1962" in Watkins, M. H. and Forster, D. F. (eds.), *ibid.*, pp. 149-160.

[100] Bowen, W. G. and Harbison, Frederick H. (eds.), *op. cit.*

[101] Gordon, R. A., "Full Employment as a Policy Goal", *op. cit.*

[102] *Ibid.*, p. 44.

[103] Professor Gordon argues that price stability is not sought after for its own sake, except perhaps by the monetary authorities in the belief that the costs of cyclical instability might thereby be reduced. Inflation becomes excessive at rates high enough to damage the functioning of the economy but as a rule is essentially a prior constraint for balance of payments equilibrium, which requires maintenance of a certain relationship between domestic and foreign prices. Balance of payments equilibrium in turn is a constraint affecting the pursuit of full employment and growth, although there may well be an absolute ceiling on the acceptable rate of unemployment in the face of which this constraint would give way. Finally, an incomes policy is designed to persuade labour to go along with the wage constraint needed for the price constraint needed for the balance of payments constraint—and therefore constitutes, in Gordon's view, a constraint of the third order.

[104] Gordon, R. A., *op. cit.*, p. 46.

[105] *Ibid.*, p. 47.

[106] *Ibid.*, p. 48.

[107] Reuber, G. L., *op. cit.*

[108] Johnson, Harry G., *op. cit.*, p. 107. U.S. Congress, Joint Economic Committee, *op. cit.*, p. 369.

[109] Bowen, W. G. and Harbison, Frederick H. (eds.), *op. cit.*

[110] Culbertson, J. M., *Full Employment or Stagnation?*, McGraw-Hill, New York, 1964.

[111] Demsetz, Harold, *op. cit.*, p. 90.

[112] Culbertson, J. M., *op. cit.*

[113] Samuelson, P. A. and Solow, R. M., *op. cit.*, pp. 382-383.

[114] U.S. Congress, Joint Economic Committee, *op. cit.*, p. 350.

[115] Johnson, Harry G., *op. cit.*

[116] Demsetz, Harold, *op. cit.*, p. 92.

[117] Samuelson, P. A. and Solow, R. M., *op. cit.*, pp. 382-383.

[118] Johnson, Harry G., *op. cit.*, p. 100.

[119] "What, then, is the economist to recommend? There is a certain sense in which the ideal solution is to begin with the short-period equilibrium wage and gradually to reduce it to the long-period level. But this would be bound to cause trouble in practice, if only because it means cheating the expectations of those

who will have acquired the skill because the wage was at the higher level, and would not have done so if the wage had been lower. It does, however, seem that the economist could look with some satisfaction upon an arrangement by which basic agreed rates are kept in some relation with the differentials that are appropriate in the long-period, while short-period scarcities are reflected in (no doubt relatively disorderly) bonuses above the agreed minima. This is far from being a perfect solution, but the problem is in its nature very difficult; it does not look as if it can admit to any simple way out. If relative wage rates are to exercise their full influence upon the supply of labour, they ought to be steady and reliable; but steady differentials will not exercise a proper effect if demands (and supplies) are changing, as they must often be expected to change." Hicks, J. R., "Economic Foundations of Wage Policy", *op. cit.*, p. 404.

[120] Economic Council of Canada, *Second Annual Review, op. cit.*

[121] Economic Council of Canada, Reuber, G. L., Bodkin, R. A., Bond, Mrs. E. P. and Robinson, T. R., *op. cit.*

[122] Economic Council of Canada, *Third Annual Review, op. cit.*, p. 159.

[123] *Ibid.*, p. 165.

[124] Lipsey postulated a model of the business cycle in which aggregate demand factors determined the timing of an upturn or a downturn while structural ceilings and floors determined how far the upswing or downswing would go. The ceiling would not be a single point but a range over which the trade-off curve would become progressively steeper (so that further increases in aggregate demand would be dissipated in price increases, as Musgrave also expressed it), rather than effective in increasing employment. As soon as a bottleneck in labour or capital develops in any sector, the ceiling begins to be encountered and it becomes increasingly constraining as more bottlenecks develop. Lipsey, R. G., "Structural and Deficient Demand Unemployment Reconsidered", *op. cit.*, p. 245. The emphasis on bottlenecks is reminiscent of the thinking of Fukuoka and others who defined structural unemployment in this way.

5

Labour Market Information and Analysis in Canada*

Noah M. Meltz

The nature and operation of the labour market have been discussed in other articles in this volume.[1] This paper will deal with two subjects: (1) the published statistics[2] and analysis of developments in the labour market, past, present and future; and (2) the gaps in labour market information.

CLASSIFYING LABOUR MARKET STATISTICS

Table 5-1 lists the major classifications used in Canada to organize labour market data. Occupation and industry classifications present the most difficulty to the uninitiated. An occupation is defined as a type of work, and the various types of work are grouped under different headings at various levels of aggregation. The 1961 Census Occupation Classification Manual divided the world of work into 12 divisions[3] containing a total of 273 classes made up of 16,000 occupation titles.

Many people confuse type of work, which is the basis for occupation classification, with kind of education and training. For example, a woman may be a graduate nurse but if she is working as a typist then her occupation is typist. Similarly, a person with a Ph.D. in Economics who is teaching at a university would be classified as a university professor, not as an economist. It is important to understand the nature and basis for each classification before attempting to work with the published data.

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* Background material for this paper was prepared by Mr. Ernest Lightman, a student in the Department of Political Economy, University of Toronto.

TABLE 5-1

Major Classifications Used in Canada to Organize Labour Market Data

1 SEX	2 AGE	3 EMPLOYED OR UNEMPLOYED	4 GEOGRAPHICAL AREA	5 INDUSTRY	6 OCCUPATION	7 HOURS WORKED	8 EARNINGS	9 EDUCATION
Male	14-19 20-24	THE LABOUR FORCE AND CENSUS	CANADA	*1960 Standard Industrial Classification Manual*	*1961 Occupation Classification Manual*	*DBS: Man-Hours and Hourly Earnings*	*DBS: Man-Hours and Hourly Earnings*	*1961 Census*
Female	25-29 30-34		*Regions;* 5 Atlantic Quebec Ontario Prairies British Columbia					Highest Grade Attained
Both Sexes	35-39 40-44 45-49 50-54 55-59 60-64 65-69 70 and over	*Employed* defined as a. did any work for pay or profit b. did any work for family business c. had a job but were without work	*Provinces;* 10	Divisions; 11 Major Groups with Divisions; 29 Classes; 295 Industry Titles; 10,000	Major Divisions; 13 Classes; 273 Occupation Titles; 16,000	–actual average hours of wage-earners	–average hourly earnings of hourly-rated wage-earners –average weekly wages of hourly-rated wage-earners	–Elementary –Less than 5 –5 and over –Secondary 1-2 3 4-5
	some publications combine age groupings		LABOUR GAZETTE presents following: Metropolitan Areas; 12 (75,000 & over)		*Classification Manual of Occupations 1951*	*DBS: Labour Force* –usually at work 35 hours or more –at work 35 hours or more –at work	*Employment and Average Average Weekly*	–Some University –University Degree
			Major		Major Groups; 16			

because of: weather, illness, industrial dispute or vacation *Unemployed* defined as a. without work and seeking work b. temporary layoff *Labour Force* that portion of civilian population 14 years and over who were employed or unemployed	Industrial Areas; 26 (25-75,000) Major Agricultural Areas; 14 Minor Areas; 58 DECENNIAL CENSUS FOR 1961 shows following: Metropolitan Areas; 11 (100,000 & over) Cities; 45 (30-100,000) Incorporated Centres; 120 (10-30,000)	Classes; 280 Occupation Titles; 14,000	less than 35 hours or not at work due to reasons a. economic b. other	*Wages and Salaries* –average weekly wages and salaries –average weekly wages (formerly called Employment and Payrolls)	*1951 Census* Years of Schooling None 1-4 5-7 8 9 10 11 12 13-16 17 and over

TABLE 5-2

Examples of the Types of Labour Market Statistics Which Are Regularly Published in Canada

Key **T** Total number of persons
M Males
F Females

LF Labour Force
E Employed
U Unemployed

Pop. Population seeking work

1	2	3	4	5	6	7
DBS: *The Labour Force*	DBS: *Employment and Average Weekly Wages and Salaries*	DBS: *Man-hours and Hourly Earnings*	Dept. of Labour: *Labour Gazette*	DBS: *Hirings and Separation Rates**	Dept. of Labour *Wage Rates, Salaries and Hours*	DBS: *Canadian Statistical Review*
MONTHLY	MONTHLY	MONTHLY	MONTHLY	SEMI-ANNUALLY	ANNUALLY	MONTHLY
Labour Force T Employed M Unemployed F Pop. T LF 14-19 E 20-64 M U F 65 and over T	Employment by month and average weekly wages and salaries for males and females combined: Canada	Average Weekly hours and wages of hourly-rated wage-earners by: Selected Industry Division Major Group Class	Selected data on: labour force labour income Employment Hours and earnings Manpower Service:	Hiring and Separation Rates in Selected Industry groups by sex by month For: Canada	Wage rates per hour (average and predominant range): selected occupations (Dept. of Labour's own	Total Labour Force Employed Unemployed Employment in Selected Industry groups Above for

Pop. Canada LF 5 Regions E M U F	Provinces Atlantic and Prairie regions 38 urban areas	For: Canada Provinces Regions Urban Areas	unfilled vacancies and registrations on hand	5 Regions	definitions) In Selected Industry Classes for Provinces and Cities	Canada and 5 Regions Employment indexes for provinces industry groups for Canada
Industry –Major Division (some grouping) of TE	Selected Industry Divisions, Major groups and classes NOTE – fewer industries are included for provinces and urban areas	as well as average hourly earnings of hourly-rated wage-earners for above	Placements effected by industry and sex Registrations on Hand by Occupation and by sex Registrations on Hand by local office area	*now discontinued	Standard hours per week: in Selected Industries in Selected Provinces and Cities	Average Hourly earnings in industry groups and weekly hours
Occupation –occasionally for major groups TE	Sex distribution of employment by major areas and major industries		Unemployment Insurance		Salaries in selected occupations in 52 communities	
Hours worked (see Table 5-1)						
Duration of Unemployment sk. und. 1 mo. " 1-3 " " 4-6 " more than 6 months			Strikes and Lockouts			

STATISTICS ON THE PRESENT AND PAST

A considerable volume of statistics dealing with different aspects of the labour market is issued regularly, primarily by the Dominion Bureau of Statistics.[4] Table 5-2 summarizes the types of data contained in the major publications. Item number 5, the DBS publication, *Hirings and Separation Rates*, has been discontinued. It can be seen that each publication concentrates on certain aspects of labour market developments. The general employment and unemployment picture is given each month in *The Labour Force*. For the most part the statistics pertain only to the national level, with a small section devoted to regions. Some figures on characteristics are included, such as the duration of unemployment, division of employment between agriculture and non-agriculture, major industry groups for employed and quarterly data on major industry and major occupation groups of the unemployed.

Employment and Average Weekly Wages and Salaries, formerly called *Employment and Payrolls*, provides monthly figures (generally shown in index form) of employment and average weekly wages and salaries for Canada, the provinces (plus Atlantic and Prairie regions) and thirty-eight urban areas. Only selected industries are included (whose industries are of sufficient size) in statistics for the provinces and also for twenty-three larger urban areas.

Seasonally adjusted figures for major industry divisions in Canada and for total provincial and regional employment are included.[5] A distribution of employment by sex is shown, but earnings are shown only for males and females combined.

Man-hours and Hourly Earnings presents statistics on hourly-rated wage earners for Canada, the provinces (plus Atlantic and Prairie regions) and fifty urban areas. A greater number of industry classes are included, as well as more urban areas, than are shown in *Employment and Average Weekly Wages and Salaries*. The data are cross-classified in terms of average weekly hours, average hourly earnings and average weekly wages.

Up to May 1967 *Hiring and Separation Rates in Certain Industries* was published every six months by the Dominion Bureau of Statistics, based on material supplied by the National

Employment Service. This document showed percentage changes in labour turnover and turnover rates by sex and by most major industry divisions and groups for Canada and the five regions. Six-month averages and monthly figures were included.

In addition to summary tables on labour force, labour income and employment, the monthly *Labour Gazette* published by the Canada Department of Labour has a section entitled Manpower Division Statistics (formerly called Employment Service Statistics). These include total placements, unplaced applicants and unfilled vacancies. Several breakdowns are provided. Placements are shown for industry division and major group in total and separately for males and females. Registrations on hand (unplaced applicants) are indicated by major occupation group and occupation division using the United States *Dictionary of Occupation Titles* classification (1949). Registrations on hand are also shown by province and urban area. The *Labour Gazette* includes other labour information such as initial and renewal claims for unemployment insurance benefits, strikes and lockouts, and employment injuries.

The Canada Department of Labour also publishes annually *Wage Rates, Salaries and Hours of Labour.* This is the only regular publication which contains earnings figures for a number of occupations.[6] The data are based on a mail survey taken each year on October 1. The results of the survey are issued between February and June each year in the form of loose-leaf tables for the industries and communities surveyed. The bound version generally appears well over a year after the survey was conducted. The report shows wage rates per hour by selected occupations in a variety of industry classes (eighty-seven) in some provinces and selected metropolitan areas. The industry average for Canada also is included. Standard hours per week are shown for some industries by province, and for selected metropolitan areas. Salaries in certain occupations are presented for fifty-two communities. This survey has been conducted annually since 1919, but it suffers from the use of unique industry and occupation classifications. This hampers comparison of the results with other on-going surveys.

The *Canadian Statistical Review* issued monthly by DBS contains a selection of data drawn from several of the publications cited above.

The following are other regularly issued publications which contain labour market information:

DBS Federal Government Employment (monthly)
DBS Provincial Government Employment (quarterly)
DBS Estimates of Employees by Province and Industry (monthly)
DBS General Review of Manufacturing Industries of Canada (annually)
Publications on various industries, derived from the DBS annual census of manufacturers.

Federal government employment and salaries are broken down by administrative classification (departments, agencies and so on) and by functions. Neither specific occupations nor occupation groups are shown. Furthermore, the data are not classified by province or regions of location. The provincial government data are shown only by function.

Estimates of Employees by Province and Industry has been issued monthly by DBS since December 1964. Data going back to 1961 are contained in the DBS reference paper, *Estimates of Employees by Province and Industry, 1961-64*, Cat. 72-503. Not all of the major industry divisions are shown in detail. For example, public administration and education are not included. Health services, recreational services, services to business management and personal services are all included under Service (commercial sector).

The *General Review of Manufacturing Industries* and the various industry publications include statistics on total employment and the breakdown between production and office workers. Annual salaries are shown on the same basis. Because of coverage differences, industry classification differences, and the timing of the annual census of manufacturers, the employment figures do not agree with those shown in the other DBS publications.

The most important sources of long-term historical data are the decennial population censuses.[7] The census provides the only comprehensive survey of the major characteristics of the labour force, cross-classified by occupation, industry, age, sex, earnings, education and hours of work. There are problems of comparability over time and certainly some deficiencies in the data, but the census is still an invaluable source of information.

A study of historical trends in occupations has been prepared by the Canada Department of Labour and is entitled *Occupational Trends in Canada 1931-1961*.[8] The author is preparing a follow-up study for the Canada Department of Manpower and Immigration which contains occupation data cross-classified by industry, earnings, education and age from the censuses of 1931, 1941, 1951 and 1961.

DESCRIPTION AND ANALYSIS OF LABOUR MARKET DEVELOPMENTS

Each of the monthly DBS publications discussed in the previous section carries with it a brief description of the most significant changes during the month. The only general assessment of labour market development during the month is published by the Manpower Division of the Canada Department of Manpower and Immigration for three regions of Canada.[9] These are entitled *Summary of Employment Conditions*. The publications contain a one or two-page summary of employment conditions plus more detailed comments on developments in industry divisions and groups, along with selected classes within manufacturing.

The notes on various industries cite specific developments which have occurred, but there are few statistics on the magnitude of the changes involved. As a result this document provides only a general impression of what has happened. The following exerpts from the report for the Ontario Region, July 1966 provide an example.

> *Agriculture*
>
> The strawberry harvest in the Simcoe area, which commenced in June, terminated quickly by the end of the first week in July. Lack of rainfall and extreme temperatures accelerated maturity. (P. 2.)
>
> *Manufacturing*
>
> *Food and Beverages*
>
> *Fish*
>
> Fish processing plants at Leamington and Chatham are operating at peak production, packaging perch and smelt. While experienced workers are in short supply, production is being maintained. (P. 5.)
>
> Experienced fish packing workers scarce

The Manpower Department publication does not attempt to draw on the results of the Labour Force survey, Employment and Payrolls or even the data on vacancies which the Manpower Department itself prepares. However, the report contains the following section which deals with special groups: Youth, Handicapped, Vocational Training, Older Workers, Veterans, Ex-Prisoners, Indians, Women, Executive and Professional.

The only other regular monthly description of developments in the labour market is contained in the *Labour Gazette.*[10] Up to mid-1962 each issue carried several pages describing developments in employment and unemployment during the month. Since then, the description section has been cut to a brief summary of developments covering less than a page. There is also a one-page section dealing with placements by the Manpower Service.

On an annual basis the *Canada Year Book* and the Bank of Canada *Annual Report* have sections on employment and unemployment developments. The first three annual reviews of the Economic Council of Canada have devoted some space to description and analysis of employment and unemployment changes, but these have been in terms of a general historical sweep.

There have been several *ad hoc* studies dealing with various aspects of the labour market in Canada. For example, the Canada Department of Labour has four on-going series: Professional Manpower Bulletins, Research Program on the Training of Skilled Manpower, Women's Bureau publications and their occasional papers. The Department also prepared a study on skilled and professional manpower for the Royal Commission on Canada's Economic Prospects (Gordon Commission).[11] The DBS is planning to return to the practice of publishing monographs dealing with various aspects of the decennial census. A monograph on the labour force based primarily on the 1961 and 1951 censuses is being prepared by Sylvia Ostry and Frank Denton of DBS.

The Economic Council of Canada has issued several staff studies which deal with various aspects of the labour market: Frank T. Denton, Yoshiko Kasahara and Sylvia Ostry, *Population and Labour Force Projections to 1970*; Frank T. Denton and Sylvia Ostry, *An Analysis of Post-War Unemployment*;

Louis Parai, *Immigration and Emigration of Professional and Skilled Manpower During the Post-War Period.*

Although a mass of statistics on various aspects of the labour market are produced each month, there is only a small amount of description and virtually no on-going analysis of the reasons for the observed changes measured by statistical data. There is also no attempt to link analytically changes in employment and earnings, even though from a theoretical point of view these are determined simultaneously at the occupation level.[12]

On an annual basis the record is little better. The Bank of Canada, the *Canada Year Book* and now the Economic Council of Canada look briefly at developments in the labour market. With the exception of the Economic Council there is little detailed analysis, although even the Council is more concerned with medium and long-term changes than with recent developments.

PROJECTIONS OF FUTURE LABOUR MARKET CONDITIONS

No regular manpower forecasting is currently being undertaken in Canada, and there have been few *ad hoc* studies. This section will review the material that has been prepared and some of the problems encountered in attempting to estimate future labour market conditions.

The methodology for undertaking projections of future labour market conditions (also called manpower forecasts) is well known. The usual steps are as follows:[13]

(1) Estimate employment by industry and occupations (numbers of persons or manhours) at a future date. This can be done in a variety of ways, but the most common is to estimate output by industry sector; productivity (output per person) in each industry; and the occupational structure of employment in each industry.

(2) Estimate turnover of persons by industry and occupation. This deals with how many people on balance will leave the occupation or industry because of death, retirement, other reasons for leaving the labour force, transfer to other occupations and industries, and emigration.

(3) Assess the education and training implications of

gross manpower requirements obtained in steps (1) and (2).

(4) Estimate potential supplies of persons with various levels and types of education and training in relation to the ability to fill different occupations in various industries.

(5) Judge the likely imbalances and the economic implications of the imbalances in terms of both employment and earnings, as well as output and productivity.

TABLE 5-3

Projections Relating to Future Labour Market Conditions

AUTHOR	TITLE	TIME PERIOD
LABOUR FORCE		
A. Regular	None	
B. *Ad Hoc*		
1. F. T. Denton, Y. Kasahara and S. Ostry	*Population and Labour Force. Projections to 1970,* Economic Council Staff Study No. 1 (1964)	1963 to 1970
2. T. M. Brown	*Canadian Economic Growth,* Royal Commission on Health Services (1964)	1961 to: 1966, 71, 76, 1981, 86, 91
3. R. E. Caves and R. H. Holton	*The Canadian Economy: Prospect and Retrospect*	1954 to 1970
4. W. C. Hood and A. Scott	*Output, Labour and Capital in the Canadian Economy,* Royal Commission on Canada's Economic Prospects (1957)	1955 to: 1960, 65, 70 1975, 80
5. Ontario Dept. of Labour	*Populations and Labour Force Projections for Economic Regions of Ontario*	1960 to 1970
6. L. F. Raphael	*Labour Force of New Brunswick 1951-1971*	1951 to 1971
OUTPUT AND PRODUCTIVITY		
A. Regular	None	
B. *Ad Hoc*		
1. B. J. Drabble	*Potential Output, 1946-70* Economic Council of Canada (1965)	1963 to 1970
2. R. E. Caves and R. H. Holton	*The Canadian Economy (1959)*	1954 or 1955 to 1970

TABLE 5-3 — Continued

3. W. C. Hood and A. Scott	*Output, Labour and Capital*	For 3 major sectors 1955-1960, 65, 70, 75 and 1980 For 8 Industry Sectors 1953-55 to 1979-81
4. T. M. Brown	*Canadian Economic Growth*	See above
EMPLOYMENT		
A. Regular		
1. Canada Dept. of Labour	Employment Forecast Survey [RESULTS ARE CONFIDENTIAL]	3 months and 6 months ahead
2. Manpower Services Ltd.	Canadian Employment Prospects	prospects for next quarter
B. *Ad Hoc*		
Industry		
1. B. J. Drabble	*Potential Output 1946-70*	1963 to 1970
2. W. C. Hood and A. Scott	*Output, Labour and Capital*	1953-55 to 1979-81
3. R. E. Caves and R. H. Holton	*The Canadian Economy*	1954 or 1955 to 1970
Occupation		
4. N. Meltz and P. Penz	*Manpower Requirements for 1970: The Occupational and Educational Implications of the Projection of Employment by the Economic Council of Canada* to be published by Canada Dept. of Manpower and Immigration	1963 to 1970
5. Economics and Research Branch, Canada Dept. of Labour	*Skilled and Professional Manpower in Canada, 1945-1965,* Royal Commission on Canada's Economic Prospects (1957)	1955 to 1965
6. S. Judek	*Medical Manpower in Canada,* Royal Commission on Health Services (1964)	1961 to: 1966, 71, 76, 1981, 86, 91
7. B. McFarlane	*Dental Manpower in Canada,* Royal Commission on Health Services (1964)	1962 to: 1966, 71, 76, 1981, 86, 91
8. Economics and Research Branch, Canada Dept. of Labour	*Employment Outlook for Professional Personnel in Scientific and Technical Fields 1962-1964* (1962)	1962 to 1964
9. Economics and Research Branch, Canada Dept. of Labour	*Employment Outlook for Professional Personnel 1960-1962* (1960)	1960 to 1962
10. Economics and Research Branch, Canada Dept. of Labour	*Employment Outlook for Professional Personnel 1958-1960* (1959)	1958 to 1960

These steps can be followed in relation to various time periods ranging from the immediate future to long run. Also the level of economic aggregation that is involved can vary from the industry level or municipality up to the total economy. In each case decisions have to be made on the dimensions of the manpower projection and on how broadly or narrowly defined the occupations, industries and education terms will be.

Table 5-3 lists the recent studies which have projected data relating to future labour market conditions. There have been several studies of population and labour force and some publications dealing with output, productivity and employment by industry. The bulk of the recent material has been produced by or for the Economic Council of Canada. There have been a few projections of specialized labour markets—for example, medical and dental personnel. In general, the occupational side has largely been neglected, even though this could provide an important source of information for educational needs.[14]

On the industry side projections have tended to be so aggregate as to preclude their use for occupational purposes. Hood and Scott in the study for the Gordon Commission (1957) divided the economy into three basic sectors—agriculture; civilian government and community services; and business—and then subdivided business into six sections. Drabble's monograph for the Economic Council (1965) contains only four economic sectors: agriculture; public administration and defense; community services; commercial non-agriculture. Caves and Holton (1957), on the other hand, did provide considerably more detail on industrial distribution of employment.

From Table 5-3 it would seem that with few exceptions (such as the Caves and Holton study) the only long-term manpower projections in Canada have been undertaken in connection with Royal Commissions. The creation of the Economic Council of Canada has led to the provision of much additional information on labour force and total employment. Unfortunately there are still few data below the aggregate level.

As for short-term projections, the only continuing government manpower survey is confidential,[15] while the private survey is of a very general nature.[16]

To be fair to government (and university) research people, there are many significant bottlenecks blocking the way to continuing projections of labour market conditions. To begin with there is a virtual absence of projections of general economic conditions. The most recent was a medium-term projection (to 1970) undertaken in 1964 by the Economic Council of Canada. Even if there were a projection of output by industry sector or by detailed industries, we have limited knowledge of productivity trends[17] and the occupational structure of industries.[18] Both productivity and occupational structure changes are affected by technology, innovations (new products and new materials, and so on), as well as by levels of production and supplies of factors of production.

Second, there is only limited information available on the relationships between occupations and education. Aside from a few specialized professional occupations, there appear to be many education and training paths to the same occupation. The decennial censuses are the only source of comprehensive data on education and all they cover are years of schooling or level of education (that is, primary, secondary school or university). We know virtually nothing about the type and quality of education received by persons in the labour force.

A third point is that people do not move from formal school or training systems into one occupation and remain there for the rest of their lives. There is a great deal of movement between jobs as well as into and out of the labour forces.[19] Turnover and mobility are crucial factors in labour market projections.[20]

Another consideration is the gap in information on the supply side. In order to undertake manpower projecting we need estimates not only of the total labour force, but also of the length and types of education and training of persons who will be in the labour force.

Finally, there is a fundamental need to bring the wage dimension into manpower projections.[21] Wage structure changes will likely affect future occupational structure of industries and vice versa. (See Professor Kruger's paper). At present we can make this statement only *a priori*. We hope that future research will examine this question, but at least it is a theoretical possibility.

These six points deal with some of the problems which are encountered in manpower forecasting. This does not mean that all problems have to be solved before any attempts can be made to project employment patterns and supply interactions. In fact the possible solution to some of these difficulties may emerge from attempts to assess future labour market conditions.

The general observation is that although methods of forecasting are well known,[22] there have been few attempts to apply the techniques either for short-term or long-term projections. While there are numerous difficulties in projections, sufficient data are available to do far more than has been done. This seems to be especially true for short-term (six to twelve-month) projections.[23]

INFORMATION GAPS

There are two types of gaps in labour market information: a lack of certain statistics, and a deficiency of analysis.

On the statistics side there is a need for current data on employment and earnings by occupation. Virtually the only source of information on employment in specific occupations is the decennial population census. The monthly labour force survey shows employment in the twelve major occupation groups.[24] The earnings data provided in the Department of Labour's *Wage Rate Survey* are confined to skilled blue collar or lower level clerical workers. This survey excluded persons in professional, sales, managerial, most service occupations and resource occupations. Moreover, the classifications of occupations are different from the other bases used in the census and the manpower service.[25]

Additional information is needed on the links between occupations and various types of education and training. This is important for educational planning. At present the one comprehensive source of information is the decennial census, but the data collected deal only with level and years of formal education.[26] There are no figures on apprenticeship or technical training and none on experience and mobility.

Job vacancy statistics are another gap; but a pilot study has been conducted by DBS and the Manpower Department, and plans are under way for a comprehensive survey.[27] As noted above, the former National Employment Service obtained statistics on unfilled vacancies as a byproduct of its operations. These data have been subject to much criticism and are suspect.

One of the most valuable tools in preparing manpower projections is an industry-occupation matrix. In another study which has almost been completed, the author has compiled detailed historical statistics on the occupational structure of industries for Canada as a whole.[28] However, the most recent data relate to 1961. A potential source of current data for major groupings is the monthly labour force survey. Although data are provided for major occupations and major industries, the cross-classification has never been published. Naturally in some cells with small numbers of persons the sampling errors would be too great. Nevertheless, much useful information could still be gained from the cells containing larger numbers.

There are fewer statistics available at the provincial level and an even smaller number for major metropolitan areas. In assessing data needs at less aggregate levels, one has to consider the benefits to be obtained from providing the statistics as opposed to the cost of obtaining the data.

In spite of the gaps in statistics there is still insufficient description and analysis of the data which are now being produced. As was mentioned earlier, there is virtually no regular publication assessing labour market conditions. At the very least what is needed is a document along the lines of the annual *Manpower Report of the President*.[29] Such analysis would be useful in manpower and education planning, as well as in providing additional knowledge about the operation of the economy.

The present monthly regional *Summaries of Employment Conditions* prepared by the Manpower Department should be upgraded at the very least to include the statistics on labour market developments which are obtained by the Manpower Department and published in the *Labour Gazette*. This report should go further and include some analyses of the reasons for the observed developments. In the United States the Department of Labor's Bureau of Labor Statistics has begun to issue a monthly assessment of the manpower situation.[30] The January-April 1967 issue dealt with the following subjects: General Manpower Indicators; Area Developments; Occupational Developments; Manpower Programs; Prospective Manpower Problems.

Another deficiency in information relates to manpower forecasting. In his paper Professor Drummond indicates how manpower forecasting can be useful in educational planning. Unfortunately, as was mentioned earlier very little manpower forecasting is being undertaken in Canada. To remedy this lack several things have to be done which follow from the points presented above. First, since manpower forecasts must rest on general economic forecasts, there is a need for more general economic forecasts. Second, the general economic forecasts have to be disaggregated—that is, broken down into a number of industry sectors. In addition, further research must be conducted on the relationship between occupational structure, productivity and level, and type of output of industries. The links between occupation and education must be examined along with the provision of more detailed statistics. The supply side has to be studied in terms of the output of various education and training systems, both formal and informal. Finally, present and future wages have to be considered in estimating future manpower requirements and supplies.

SUMMARY

There is a large volume of detailed statistics published either monthly or annually which deal with various aspects of the labour market in Canada. In spite of the substantial amount of data, there are still gaps in the statistics—primarily, a lack of information on employment and earnings by occupations. There is little description of recent developments in the individual reports and almost no regular analysis of the factors responsible for the developments.

Recently some general economic forecasts have been prepared, but there has been virtually no manpower forecasting as such. There have been few attempts to asses the short-term or medium-term labour market outlook. To undertake manpower forecasting, researchers must draw on the results of general economic analysis and studies of current labour market conditions.

NOTES AND REFERENCES

[1] See especially Professor Kruger's article.

[2] For another treatment of this subject see the article by Ostry, S. and Bailey, Donald J., "Canadian Manpower Statistics", *Canadian Statistical Review*, Volume 42, Number 3, March 1967,

Ottawa: Dominion Bureau of Statistics. The Ostry-Bailey article appeared after this paper was originally drafted.

[3] The 1961 classification contains a 13th division, "Occupation Not Stated".

[4] For a complete listing of published labour data including industrial relations and industrial accident information, see Porter, Allan A., *Directory of Canadian Labour Statistics*, National Industrial Conference Board, Canadian Studies No. 6, Montreal, 1963.

[5] As a result of the less than full coverage, there are differences between the numbers of persons in major division totals for the provinces when compared with figures presented in *Estimates of Employees by Province and Industry*.

[6] Income Data for self-employed persons in a few occupations are contained in an annual publication of the Department of National Revenue derived from Income Tax returns.

[7] See also Urquhart, M. C., (ed.) and Buckley, K. A., (assistant ed.), *Historical Statistics of Canada*, Macmillan, Toronto, 1965. This volume includes data on labour force, wage rates, annual earnings and hours of work, with some industry and occupation information.

[8] Department of Labour, *Research Program on the Training of Skilled Manpower*, Report No. 11, Queen's Printer, Ottawa, 1963.

[9] The regions are Atlantic, Ontario and Prairie. The Quebec and Pacific regional publications are still prepared, but only for internal use.

[10] The *Summary of Employment Conditions* is issued three to four weeks after the month covered by the bulletin. The *Labour Gazette* has a three to four-month lag: for example the issue received in late July deals with employment developments in April.

[11] Economics and Research Branch, Department of Labour of Canada, *Skilled and Professional Manpower in Canada, 1945-1965*, Royal Commission on Canada's Economic Prospects, Ottawa, 1957.

[12] See Professor Kruger's paper where he presents the theoretical models of the labour market. For an example of a model relating employment and earnings and its application to Canadian occupational data, see Meltz, Noah M., *Changes in the Occupational Composition of the Canadian Labour Force, 1931-1961*, Queen's Printer, Ottawa, 1965, Chapter 5 "Shifts in Demand and Supply Curves for Labour by Occupation".

[13] For an outline and discussion of the various techniques of manpower forecasting along with an extensive bibliography, see Meh-

met, Ozay, *Methods of Forecasting Manpower Requirements, with special reference to the Province of Ontario*, a study prepared for the Ontario Department of Labour and the Centre for Industrial Relations, University of Toronto, 1966.

For a discussion of the problems of forecasting manpower requirements and supplies in Canada, see Meltz, Noah M., *The Applications and Limitations of Manpower Forecasting*, Privy Council, Special Planning Secretariat, Ottawa, 1965.

[14] See Professor Drummond's paper for a discussion of the relationship between manpower forecasting and educational planning.

[15] The Federal Department of Labour each quarter conducts a survey of large firms asking for their employment expectations three and six months ahead. This is called the Employment Forecast Survey. For a critical appraisal of the survey, see Hartle, D., *The Employment Forecast Survey*, University of Toronto, Canadian Studies in Economics, No. 14, Toronto, 1962.

See also Hartle, D., "Predictions Derived from the Employment Forecast Survey", *Canadian Journal of Economics and Political Science*, Vol. 24, 1958, pp. 373-390.

[16] This survey is prepared by Manpower Services Ltd.

[17] Some studies of productivity have been undertaken. For example, see Dominion Bureau of Statistics, *Indexes of Output per Person Employed and Per Man-Hour in Canada, Commercial Nonagricultural Industries 1947-63*, Ottawa, 1965. Unfortunately the only breakdown here is between Manufacturing and Nonmanufacturing.

Crude productivity measures can be constructed using the DBS publication, *Indexes of Real Domestic Product by Industry of Origin 1935-1961*, Ottawa, 1963 and employment estimates attained from the labour force survey or other employment series. For example see Drabble's study for the Economic Council or Meltz, Noah M., *Changes in Occupational Composition, op. cit.*, Chapter 7.

[18] Such data on the occupational structure of industries are being published by the Canada Department of Manpower and Immigration. The preparation of these data were supervised by the author.

[19] In the United States it is generally believed that more employment opportunities arise from turnover than through the creation of new jobs.

[20] See following issues of Canadian Statistical Review published monthly by DBS.

Nov. 1961 "Labour Mobility of Persons covered by Unemployment Insurance"

Jan. 1962 "Inter-Industry Labour Mobility"

Feb. 1962 "Inter-Occupation Mobility"
April 1962 "Unemployment as a Factor in Labour Mobility".

[21] It was noted above that there has also been a neglect of description and analysis of the current labour market situation.

[22] See Footnote 13.

[23] The Department of Trade and Commerce has a short-term forecasting model which Sid May developed originally and which the Department is now revising. The Bank of Canada is also developing an econometric model. In addition a group of econometricians at the University of Toronto (Professors Choudhry, Kotowitz, Sawyer and Winder) are developing their own short-term forecasting model. Eventually they hope to be able to provide estimates of employment and man-hours by major industry division. Perhaps one of these or the Department of Labour's Employment Forecast Survey could be used as a base for assessing occupational requirements.

[24] Employment estimates for some occupations are available through professional associations, but there are classification difficulties between persons trained in a particular field and persons performing a certain occupation. See the earlier discussion of occupation classification.

DBS publishes regular statistics on some selected occupations—for example, university teachers. The Canada Department of Labour's Professional Manpower Bulletins provide information on engineers and scientists, but these deal only with persons who have received a formal education in engineering or science.

[25] The classification deficiency will be removed when the current joint project of the Manpower Department and DBS on a Dictionary and Classification Manual of Occupations in Canada has been completed.

[26] In the 1961 census the published data present number of persons by years of schooling within elementary, high school, some university as well as university degree. The 1951 and 1941 censuses only asked for years of schooling.

[27] For a discussion of job vacancy statistics, see National Bureau of Economic Research, *Measurement and Interpretation of Job Vacancies*, 1966.

[28] This study will be published by the Canada Department of Manpower and Immigration.

[29] U.S. Department of Labor, *Manpower Report of the President and a Report on Manpower Requirements, Resources, Utilization and Training*, U.S. Government Printing Office, Washington, March 1966.

The March 1966 Report included the following sections: Review of Current Developments; The Manpower Outlook; The Hidden

Costs of Unemployment; Unused Manpower Resources and Their Development.

[80] U.S. Department of Labor, *Report on Manpower Requirements and Resources,* May 9, 1967. This publication is prepared jointly by the Bureau of Labor Statistics and the U.S. Employment Services, Bureau of Employment Security and the affiliated State Employment Services.

Author's note: Since the article was prepared several studies have appeared which, unfortunately, could not be included among the references.

6

Labour Markets and Educational Planning

Ian Drummond

INTRODUCTION: THE EDUCATIONAL SYSTEM AND LABOUR MARKETS

This paper provides a survey of some educational planning techniques. We shall explore some ways of bringing economic considerations to bear on educational planning. Why discuss such a matter in a book on labour markets? Is there any connection between educational planning and labour markets? Why should educational planners be interested in labour markets, and why should labour economists know about educational planning?

To these questions two general answers can be given. Their full import will become clear in the course of the paper itself.

First of all, labour is neither homogeneous nor inert. The labour force consists of many individuals, each of whom has different capabilities, experience and formal education. For many jobs, definite training is either necessary or conventionally demanded. If a person lacks the relevant education—specialized, or general to some appropriate level—he is usually unable to get such a job. As people flow out of the educational system, they join a labour force which is composed of various specialized groups. Education is one of the more important factors which fix their points of entry and the occupational choices which are open to them immediately or later. Both the amount and the type of education are relevant. In other words, the educational system is of great importance in establishing the relative supplies of each kind of labour. Some people may acquire not only skills but likes and dislikes while at school. These likes and dislikes affect the work they are willing to do, and also the goods they will consume when employed. Both labour supplies and labour demands are changed thereby. Further, the educational system itself is a very large employer of skilled people. Because relative supplies and demands for labour determine relative earnings, as Professor Kruger argues in this volume,[1] relative earnings depend in part upon the present and past efforts of the educational system.

Second, education generally raises the productive potential of the graduates. This productive potential is created by the schooling process, just as the productive potential of a machine is created in the process of its manufacture. Accustomed to calling the machine "physical capital", economists have begun to call the result of education "human capital". The educational process thus becomes "human capital formation".

Different people receive different wages for different reasons. Even if nobody attended schools there would be differences in wages. Nevertheless, generally speaking, schooling does tend to raise a person's earnings. Part of the wage is a return to raw physical labour and part may be a return to innate ability, but part seems to be a return on the "human capital" which education has embodied in the person. However, each kind of human capital is actually bought and sold in the labour market, because the user buys the services of human capital in this market. In other words, today's "labour" market is largely a "human capital" market. Therefore, the productive contribution of human capital must be reflected, along with the contribution of innate ability and other circumstances, in the wages and salaries which are paid to the owners of human capital—the people in whom it is embodied.

If education were not a socially productive investment, it would not raise social output by more than its own cost. The economist would not be very interested in it—except insofar as it affects labour supplies in various occupations, and insofar as its financing is a knotty problem for public finance. In the statistical section of this paper, we shall see that most education is indeed a social investment in the economist's sense. However, we should first pause and consider just how education does raise output. Here, as elsewhere in this paper, we are really talking about formal education. Though there are other ways of learning, and other ways of forming human capital, we shall not discuss them here.

HOW EDUCATION RAISES OUTPUT

We use three headings—raising output per worker, assisting interoccupational movement and changing business decisions—in discussing the connection between education and output.[2]

Raising Output Per Worker

Education may raise the output per worker by raising the general or specific level of his knowledge. If this happens, the relatively well-schooled worker will produce more than the relatively ill-schooled worker who is working with exactly the same equipment and doing exactly the same job. Obviously this does not always happen. But there is some evidence that it does sometimes happen. Miss Podoluk has shown[3] that lifetime earnings tend to rise within each occupational group as the level of education rises. For example, a professional engineer will earn $227,803 if he has incomplete secondary schooling, but he will get $280,328 if he has some incomplete university training. Unfortunately, these data are too aggregated to prove the point. The better-educated engineer may be doing different work, and he may be using more or better equipment. Further, in all the craft and production occupations for which Miss Podoluk has calculated lifetime earnings, the lifetime earnings are *lower* if one has some post-secondary education than if one has no post-secondary education! Obviously much careful research is needed before we can say much on this subject. It will be necessary to pair workers by type of work and ancillary equipment, or to use the statistical techniques which separate the effects of various things when all vary together. At present, our data do not prove that more education actually raises a man's potential output if he is doing the same work with the same tools as a less-schooled man; further, they do not show which form of schooling—formal, informal or in-plant training—is the most socially productive per dollar of educational spending.

Movement into More Productive Occupations

Second, education allows people to move from low-productivity to high-productivity occupations. The educational system produces the highly trained and specialized professionals on whose service society places such high values. In Canada, thanks to the educational system and to immigration, the numbers of such people have increased both absolutely and relative to the labour force. If produced by education this change in the distribution of the labour force is costly, yet it yields an increase in potential output which may or may not exceed the cost. The bigger the *net* benefit, the more rapid the growth in potential output. Similarly, without education it is difficult for workers to leave low-productivity work, especially in depressed regions, in agriculture and in other extractive industries. The transition to city life is more difficult, both for economic and for social reasons, if the would-be migrant is ill-schooled. Yet one cannot create urban jobs for the children of farmers, or high-level professional employment for the children of high-school graduates, merely by educating. Human capital formation, like physical capital formation, adds to society's potential output, but the actual output will increase only if demand expands in step with potential output. Furthermore, human capital, unlike physical capital, is mobile. It can and will leave the country if there are better opportunities elsewhere.

Miss Podoluk's research has shown us just how great is the gross gain from interoccupational movement. Miss Podoluk finds that the lifetime income of a male professional or technical worker is $354,143, compared with $170,676 for a craftsman with complete secondary education and $216,961 for a salesman with the same secondary education.[4] The educational payoffs are consistently larger when more education is combined with interoccupational movement. Thus, if the salesman has a university degree, he earns $255,850 in his lifetime, which is only $38,989 more than he would have earned with a high-school education. But if his degree had moved him into a professional or technical occupation, his lifetime earnings would have been raised by $137,182, more than three times as much. Though the figures are different for other occupational groups, the general pattern is the same: more schooling means much more income, and therefore more output, if it is accompanied by interoccupational movement.

In the light of Miss Podoluk's findings it seems plausible to argue, as the Economic Council does in its Second Report,[5] that the key to more growth is more education. Unfortunately, Miss Podoluk has not shown that the economic benefits *to society* exceed the costs *to society*, because she compares *private* costs and benefits.[6] Further, as yet the Council has talked about the payoff from education in general, not from any particular kind of education. It remains to be seen whether all forms of education would yield social benefits in excess of their social costs. Though Professor Bertram has shown that the level of schooling is lower in Canada than in the United States, he has also shown that we do not now retain all the educated labour we so expensively train. This fact makes one wonder whether an educational expansion might not simply produce a larger emigration of the highly-educated.

Since the early 1920's it has been difficult for many Europeans to enter the United States, because of the American quota system and because immigrant visas have been granted only to those who had jobs or assured means of support. On the other hand, Canadian-born people could enter the United States with relatively little trouble, while Canada has generally been more receptive to European immigrants than the United States has been. Earnings have been higher in the United States than in Canada, and higher in Canada than in Europe. Migrants seem to be more aware of foreign openings if they are relatively well-educated. Finally, the American immigration laws work in favour of the well-educated immigrant, who is more likely to be able to find an American job before entering the United States, while sentiment often attracts immigrants to Canada, at least from Britain. The effect is a drift of Canadians to the United States and a drift of Europeans to Canada. The highly educated have been especially noticeable in both movements.

Business Decisions

By affecting the level and type of knowledge in the population, education may affect business decisions and the dynamics of industrial change. Some people say that if managers know more science they will adopt technical change more rapidly. Others say that if there are plenty of scientists and engineers in the labour force, more technical changes will occur, more will be borrowed from abroad, and more helpful indigenous inventions will be developed. Still others say that it is the level, not the type, of managerial education which matters. They worry about the fact that Canadian managers have less formal education than American managers. Finally, there are those who claim that widely diffused general education or specific types of technical education allow the economy to adopt new products or techniques which cannot be profitably used unless the factory labour force, not the management, possesses the needed skills. The standard examples are chemical and electronics industries. Assertions are often buttressed by references to the German industrial expansion of the late nineteenth century.[7]

At first sight, it is hard to know what to make of the assertion about the industrial labour force. If he is familiar with our recent immigration and emigration experience, the Canadian economist is likely to cast a very cold eye upon it. After all, in the 1950's we drew many thousands of skilled workers and professional people from abroad. Surely, one would think, the international labour market works well enough to ensure that Canadian industry will get the labour it needs. Businessmen should be able to plan the development of their production without worrying about the details of labour supply.

But things may not be that simple. Canadian employers may not know just how good the international labour market is. Their ignorance may affect their plans for starting new kinds of industry, or for adopting new technologies. If their plans are tailored to the existing pattern of labour skills, as known to them, some things might not be tried which would be tried if *local* labour was known to be available. Conversely, if employers know that the Canadian trade schools are grinding out certain kinds of graduates, they may assume that they can get the skilled workers and professionals they need, and act accordingly. If this happens, there need be no fall in the relative earnings of the well-schooled in Canada, and no increased tendency to emigrate, because demand for the educated will tend to increase in step with supply.[8]

As for the fact that Canadian managers have less education than American managers, it remains to be shown just how this educational shortfall might have affected our managerial performance. We cannot assume that our managers are less prone to innovate, less calculatingly rational in their efforts to save resources or find new products or markets, merely because they lack some two years of formal schooling. It is sometimes claimed that if executives have relatively limited schooling, they will be less responsive to new ideas, and less imaginative. But the connection here is rather dubious. One might equally well argue that education breeds conservatism by assimilating the student to the status quo. Further, one still faces the possibility that the highly schooled and efficient manager will simply take his greater efficiency to the United States or elsewhere. The situation would be different if the educational disparity were really great—if, for instance, the typical Canadian manager had not finished elementary school, while the typical American had a doctorate in business administration. But that is not the situation. On the average, American managers have just barely finished high school, while Canadian managers have not quite made it that far; the average disparity in 1960-1961 was about 2.5 years.[9] Until managerial productivity has been more closely studied, we should probably not infer anything about our growth performance from this fact, nor need we necessarily place a high priority on the narrowing of the gap. After all, through our links with American corporations we can already draw on very highly trained American managers, and on the ideas of talented people in head offices. Of course, research might reveal that our managers are actually less productive, that faulty education is the cause and that they will not simply emigrate if we raise their productivity by educating them better. But for the moment the whole matter deserves a verdict of "not proven".

Summary and Conclusion

Though some education does not raise output by more than its cost, and though some dubious arguments have been used to support the claim that education is an investment, we must admit that some education is certainly a social investment, and that all education might be.

Whatever its effect on output potential, educational effort will affect labour market conditions. Our past educational effort has interacted with other circumstances to produce the changing employment patterns of the past thirty years. These are briefly described in the next section.

CHANGING LABOUR MARKETS: THE RECORD

During the past thirty years, both labour demand and labour supply in Canada have changed a great deal. For an elaborate account of these changes, the reader should consult Professor

Meltz' study on the subject.[10] The present brief discussion is not meant to summarize Professor Meltz' treatment, nor is it a fully balanced account of all changes. It emphasizes those changes which are most obviously related to educational output and input.

First consider the supply side of Canada's labour markets. The average period of schooling in Canada has been rising for many decades. The cumulative effect of this is a rise in the level of schooling in the labour force. Each year the national economy receives a cohort of school-leavers who have a higher average level of schooling than the previous year's cohort. In other words, the relative supply of the highly educated has been increasing, and the relative supply of the ill-educated has been decreasing. In terms of supply curves, the supply of the well-educated has been shifting outward from the origin much more rapidly than the supply of the ill-educated. Though emigration has taken some of the highly educated from Canada, on balance we have gained more university-trained persons than we have lost.[11] Immigration and emigration have probably increased our average educational level. The effect, however, seems to have been very small.[12] It was chiefly our own educational effort, rather than net migration, which raised the median level of schooling of our male labour force from 6.6 years in 1911 to 9.15 years in 1961.[13]

On the demand side, there have been changes in the demands for various final outputs which have interacted with technical change and changes in relative prices, producing changes in the employments of various kinds of labour. Among the more important changes have been the relative growth in demand for employees in public employment, certain professions, and teaching, where educational qualifications are relatively high. Demand shifts have interacted with supply shifts to produce marked changes in the pattern of employment and relative earnings. Thus from 1941 to 1961, professional and technical occupations rose from 6.8 per cent of the labour force to 9.7 per cent, absorbing 17 per cent of the total increase in employment, and under this heading the teaching profession alone absorbed 4.6 per cent of the entire labour force increase, and the various health professions 4.1 per cent.[14] The figure of 17 per cent is doubly impressive when one remembers that in 1961 only some

10 per cent of the relevant age group was receiving any sort of formal post-secondary schooling. One should also remember that many of the managerial personnel, who rose from 5.1 per cent to 8.3 per cent, making up 15 per cent of the increase in the labour force, had some form of higher education. Meanwhile agricultural employment fell from 25.1 per cent to 10 per cent of the labour force, and labourers fell from 6.4 per cent to 3.2 per cent.

Without our increasing educational effort, these shifts in employment would have been much less dramatic. The wages of the more highly educated would have risen more rapidly than they actually did rise, thereby rationing the smaller supply among fewer but more valuable uses. On the other hand, people have certainly been motivated to seek more education—secondary and higher education—because they believed that such schooling opened the way to attractive jobs, and because it seemed to pay off in terms of the private costs of obtaining schooling. Miss Podoluk has recently shown[15] that in 1961 the private costs of secondary schooling yielded a return of 16.3 per cent[16] on its capital cost. At university level the private return was 19.7 per cent. Obviously these rates are high enough to be attractive. Other considerations aside, it is hardly surprising that Canadians have tended to stay longer and longer in school. Though private costs and benefits may change in future, as relative supplies and demands change, we may reasonably expect that private payoffs will remain sufficiently high, relative to private costs, to ensure a continued rise in our average level of schooling, even if governments should not provide any new encouragements.

Because education affects labour markets and because it raises potential output in the three ways we have discussed on pages 245-249, educational planners are increasingly aware that their plans must consider the economy. They have been less quick to see that much of their data must come from the economy, or that they must cooperate with economists, especially with students of the labour market, if they are to get the best data and use them to advantage. The reasons for this interdependence cannot be accurately stated in a few words. It is hoped that they will be clear after the extended discussion of planning technique in the next two sections of this paper.

5

COST-BENEFIT CALCULATIONS IN EDUCATIONAL PLANNING

General Problems

If educational programs are to be linked with economic criteria, it is not enough just to provide more education. A good educational program would have to pass various tests before it could be economically acceptable. The economic point of view is not, of course, the only one, nor need it be the proper one. A society might quite properly choose to construct an educational system which was economically wasteful. The economist would have no reason to criticize, though he would want to point out just how large were the economic costs which resulted from the pursuit of other ends. Furthermore, calculations of economic payoffs could *logically* be combined with other sorts of payoff —spiritual growth, life-adjustment, happiness or aesthetic appreciation, for example. This logical possibility is impossible in practice; therefore, the planner must design an educational system which achieves at least some minimum level of performance on each of the non-economic fronts, so to speak, as well as meeting some minimum test of economic performance. If the planner or analyst is an economist, he tends to forget these other aspects of educational performance which lie outside his professional competence. Others must be on guard, therefore, lest the economic analysis of education produce a perverted educational system. However, the planners need not eschew economic analysis merely because it can be misused.

An educational project might be asked, depending on the observer's viewpoint, to pass any one of three economic tests. At the very least, the program must yield social benefits which exceed its entire social costs. Further, its benefits should be sufficiently in excess of cost to render its rate of return to society at least as high as the rate of return on other sorts of investment. That is, society should get at least as much benefit from a dollar invested in human capital as from a dollar invested in physical capital. Finally, given the decision to create human capital, the planner should try to attain the highest possible social benefit per dollar of outlay.

In a modern industrialized society such as Canada's it is difficult to plan the educational system for maximum economic advantage. Paradoxically, the task is easier in an industrializing country with a relatively simple economic structure, because economic needs are then more obvious and because technical and budgetary constraints set bounds to the educational plan. But in present-day Canada, the educational planner will need all the analytical tools which are available. The main techniques are cost-benefit analysis and manpower planning,[17] discussed in this and following sections of this paper. Both methods should be used, because they complement each other rather than operate independently.

Neither technique can be used accurately until more data have been assembled. At present it is impossible for an "outside" scholar to make many detailed suggestions about the direction of educational development, because the published data are so exiguous. But the situation is likely much the same within the educational bureaucracy.

In the past, most educational authorities have had a very simple idea of educational planning. They have thought in terms of meeting popular demand for education by providing the appropriate number of student places. More recently they have spliced together this idea of "educational need" and the idea of "economic needs". When these economic needs are calculated from manpower forecasts, though the calculations themselves are complicated the conclusions have the same simple appearance as the "educational needs" with which the authorities are familiar. One must create so many places, so as to produce so many graduates. Perhaps this straightforward similarity explains why educators have found the idea of manpower forecasting so attractive.[18] Nevertheless, however much they may like the idea of manpower forecasting, they must not take the forecasts at face value, and they must explore other avenues of analysis if they want to increase the economic effectiveness of their educational programs. They must, in short, be willing to compare educational benefits and costs.

There are two approaches which may be taken in the comparison of educational benefits and costs. The benefits to the individual may be compared with his own personal costs of acquiring the education. The result is a private cost-benefit comparison.[19] On the other hand, the benefits which the country derives from providing a particular kind of education may be balanced against the cost to the country of providing it. The result is a social cost-benefit comparison.[20]

Both social and private cost-benefit calculations are equally valuable and meaningful, but they do not usually give the same answers and they must be used to answer different questions. If an economically rational individual is deciding whether to invest in more schooling, in more plant and equipment, or in more bonds, he will compare private costs and benefits. If an economically rational government is trying to decide whether to encourage schooling or physical investment, it will compare social costs and benefits. In our society persons are not compelled to go to school beyond sixteen years of age. Unless private benefits are sufficiently high relative to private costs, beyond this age no one will enroll—no matter how attractive a particular kind of schooling may seem in terms of social cost-benefit calculations.

Both in social and in private cost-benefit comparisons, there are measurable and immeasurable benefits. For the individual, the most important measurable benefit is likely to be the additional income he will get if he invests in his own education. However, immeasurable benefits may be more important and may determine his choice. For instance, he may expect to derive non-monetary satisfactions from a certain job which he can enter only via formal schooling. Also, he may enjoy the educational process itself. Finally, he may expect that more education will make him happier in the future. All these private immeasurables, and more, may be called "consumption benefits", though it is stretching a point to pretend that they are all economic.

For the society, the dominant measurable benefit is the additional output which educational investment permits. The best available measure of this benefit is the additional income of individuals; the usual calculation compares the before-tax income of a certain occupation of schooling level with the before-tax income of the next-lowest schooling level, and attributes some or all of the absolute difference—the income differential—to the schooling. This is at best an imperfect measure. But it is hard to see an alternative. As for the immeasurable benefits from the social point of view, these obviously must include the consumption benefits which individuals derive from education, because social welfare rises when individuals derive such benefits. However, the list of immeasurables is longer from the social viewpoint than from the private.[21] The additional immeasurables may be called "external benefits", because they accrue to society at large, not to the individuals—employers and employees—who directly apply the human capital in production. Some of the benefits are economic, such as a higher rate of innovation or a more efficiently organized economy. Some are non-economic. For instance, some people believe that more education produces a more stable polity, the rule of law or social peace.

Other external benefits could easily be added to the list. Some of these are rather hard to classify. For example, if the population becomes more responsive to beauty, the main gain seems to accrue to individuals as a private consumption benefit. But even here there are external effects. If my aesthetic sensibility leads me to construct a beautiful building, others benefit from my choice, even though I can neither charge them for their pleasure nor share in their pleasure myself. Similarly, if there is any gain from life-adjustment it must accrue to persons who are, by assumption, happier if adjusted than not. But if an individual is well-adjusted, the theorists of life-adjustment expect that things will be easier for others; if everyone were well-adjusted, society would be not only happier but, probably, more productive.[22] But our present concern is not to provide a complete listing and sorting-out of all the immeasurable benefits; we are trying to see only how they fit in to the cost-benefit scheme.[23]

Cost-benefit calculations, social or private, may be made in either of two ways. One may calculate benefits and costs separately, "discounting" the former and "compounding" the latter to some single date by means of an appropriate interest rate. The logic of discounting is simple. From today's point of view, future payoffs are not now worth their eventual dollar payoff, because one must wait to get them; past outlays now involve more than their initial dollar amount, because one has had to tie up money in them. For instance, if I buy a piece of land and keep it for five years, I shall expect to be able to sell it for at least the purchase price plus interest; otherwise, I shall have lost something by holding the land. Similarly, if I expect to receive $5,000 in ten years, I would sell my claim on that $5,000 for much less than $5,000 today, because today I can put that money to work only if I have it now, and not in five years. If we want to discount costs and compound benefits, we use an interest rate to represent the sacrificed opportunities involved in past outlays, and in the waiting for future benefits.[24]

It is also possible to *calculate* a rate of discount which equates the stream of future dollar benefits with the stream of costs, from the standpoint of some one date. This second method yields an "internal rate of return". The first method yields a "benefit-cost ratio"—a ratio between discounted benefits and costs. A project will have a high benefit-cost ratio if it also has a high internal rate of return.

If the benefit-cost ratio is unity, the internal rate of return is the same as the rate of interest at which benefits and costs were discounted and compounded. An educational project makes economic sense if its cost-benefit ratio exceeds unity. It makes sense compared with alternative investments if its cost-benefit ratio is at least as great as those of the alternatives. Beyond this point, the higher the cost-benefit ratio, the better the educational project. The same statements can be made in terms of an internal rate of return. Miss Podoluk's private rate of return on education[25] is just such an internal rate. The discussion of this paper is couched in terms of ratios, but the same data are needed for both sorts of computation. If the reader wishes, he can mentally transpose into the other terminology.

Cost-benefit calculations can be made for an educational *scheme* or for an educational *system*. By *scheme* I mean a particular and limited item. For instance, if we are considering a nursing school which will produce forty nurses per year, we are examining an educational *scheme*. But if we are examining the entire educational effort of a province—all the schemes—we are looking at an educational *system*. The cost-benefit analysis is equally applicable to existing arrangements and to new proposals. The calculations will not be exactly the same for new and old schemes and systems. In particular, when we look at old arrangements we need to include land charges and capital charges—interest, rent and depreciation—only if the buildings and equipment have alternative uses inside or outside the educational system. But the logic of the operation, a comparison of all relevant benefits with all relevant costs, is the same.

For an educational scheme, in principle one could stop after the calculation of a single cost-benefit ratio. However, if one wants to take numerical account of consumption benefits, external effects, ability and market imperfections, or to allow for different social rates of discount, one can compute several ratios for the same scheme. Each ratio would be based on a different numerical assumption about these immeasurables. Further, if one wants to compare different schemes which all yield the same effect in terms of graduates, but which have different instructional systems, one can compute cost-benefit ratios for each scheme and choose the scheme whose cost-benefit ratio is highest. When one combines the different estimates of the immeasurables with different social rates of discount and different cost structures, one may generate many cost-benefit ratios even for a small and simple educational *task*.

For an educational system, one can add the benefits and costs of the educational schemes which make it up. The result is an overall cost-benefit ratio for the system as a whole. However, one must be sure that the various schemes are consistent with one another. There might be many kinds of inconsistency. Higher levels might be planned to absorb more students than the lower levels are graduating. Lower levels might be planned to absorb more teachers than the higher levels are graduating. The analyst may overstate or understate income differentials, given graduations from each level of education, which affect relative supplies, and given teacher needs, which affect relative demands. "Continuation ratios", the percentage of graduates from each grade who continue to the next grade, may be unrealistic in the light of past experience or expected developments. Most of these inconsistencies can be detected if the analyst constructs a model of student progress through the schools. Such models are already common among educational planners. But these planners usually have not thought about relative earnings, the "earnings aspect" of consistency. To catch mistakes here, they must think in terms of the labour market, not just in terms of the pupil-teacher ratio.[26]

The Benefit Side

Turning to more technical details, let us first consider the benefits. The annual increase in measured social output is usually assessed by means of income-differentials. If we find that the average doctor makes $10,000 more per year than the average high school graduate, we attribute that $10,000 to the doctor's education, and we use it as a preliminary measure of society's annual benefit from his education.

The difference between the income of the schooled and the income of the less-schooled has been adopted here as the best available measure of economically relevant benefits. This is not a perfect measure, but at least it is an intelligible starting point whose meaning is reasonably clear and whose imperfections can easily be understood. Further, it is logically related to the additional output which education makes possible.

In the paper that follows, Professor Stager argues that one measure of educational output, or social benefit, is intellectual development. He believes that most educators would agree with him. It is possible, however, that many educators are more interested in life-adjustment, development of aesthetic appreciation or spiritual growth, than in problem-solving. As Professor Stager points out, education provides or may provide many things to its students, and to society at large. If we are interested in only one of these things—problem-solving, for instance—we will want to measure as social benefit the extent to which education pays off along that particular line. If we are more interested in life-adjustment, we shall want to measure education's success in producing this, not in producing problem-solving ability. If we are concerned with the extent to which education raises society's output of goods and services, we must try to measure this additional output, not intellectual development, life-adjustment or problem solving. And so on.

In effect, a different measure of output or benefit is proper for each different question about the performance of the educational system. If we are interested in overall performance, we must somehow convert our particular indices of performance into some common unit and add them so as to get an index of overall performance. This does not seem very practicable. Many aspects of performance have not been measured; many, one suspects, cannot be measured; there seems to be no common unit in which all indices can be expressed and combined. Therefore, we are perhaps obliged to construct numerical indices in terms of some single aspect of performance, and to relegate others to a qualitative discussion. This solution is adopted in this paper, where income differentials are used as the best available measure of economic productivity, and where other considerations are lumped together under the headings of external benefits and consumption benefits.

In passing we should note that there is some overlap between this one aspect of performance and others. For example, one effect of a college education is to increase problem-solving ability; another is often to adjust the person more closely to a highly organized society of large units. Both of these effects, on problem-solving and on life-adjustment, will raise the student's productivity when he enters the labour market.[27] However, the overlap is far from perfect.

Given the decision to concentrate upon the output-creating effect of education, why should we choose to measure this benefit by means of income-differentials? Professor Stager argues that these differentials, the gaps between the earnings of one kind of worker and another, are an imperfect measure, because labour markets are imperfect since employers pay economically irrational wages and because some of the differential results from differences in ability arising from circumstances other than differences in education.

As for the irrationality of employers, it is difficult to judge whether *any* employers actually ever pay a worker more than he is really worth to the business or government merely because he has a certain formal educational qualification. Nor do we know how widespread the practice may be, granted it exists. It is all too easy for the outsider to say, "You don't really need a man with such high qualifications", and for the employer to respond, "Of course I do". Given these uncertainties, it seems safer to retain the orthodox economic assumption that private businessmen try to get as much mileage out of a dollar's outlay as they possibly can. For the public sector, it is desirable to make the same assumption.

As for ability, it is assumed in these calculations that economically relevant ability is not correlated with level of education; that is, it is assumed that the total observed income differentials are due solely to education, and that other marketable talents are not reflected in the education men get. This is certainly an oversimplification. It is easy to calculate benefits on some other assumption—for instance, that 60 per cent of observed income differential results from formal education and that 40 per cent results from differences in economically relevant ability.[28] Unfortunately, there is no measure of economically relevant ability. This sort of ability overlaps with the abilities to solve problems and to pass examinations but is not the same as either. It is doubtful whether economically relevant ability can be measured;

certainly it has not been measured. Therefore, this factor may be ignored. But the logic of a cost-benefit calculation does not force the economist to do this. The cost-benefit analyst can make whatever adjustment for ability he wants to make.

Finally, there is the problem of market imperfections: unions, professional associations, controls over entry, single employers and all the other sources of market imperfections which might be relevant. Professor Stager demonstrates that such imperfections are important in principle. For instance, if a professional association is able to control the entry of new members, its earnings will be higher than they would otherwise be. Thus the higher earnings of the members reflect partly their professional education, and partly their power to manipulate the market for their services.

In the calculations used here, all such imperfections are ignored. This is done for two reasons. First, one can exaggerate their real effect on earnings. Second, apparently no data are available with which numerical adjustments could be made for such imperfections as undoubtedly exist.

In any event, even adjusted differentials would not precisely disclose the measurable educational benefits for purposes of educational planning. There are two reasons for the lack of precision. First of all, the human capital will not receive all of the additional income which results from the additional output its work creates; some will go to the other factors of production which cooperate with human capital in the productive process. Second, if labour is used in a particular occupation it is drawn away from leisure, from other occupations, or from both. The cost of this sacrificed leisure and output is not necessarily the earnings in the next-lowest alternative and less-schooled occupation. Figure 6-1 is meant to illustrate these statements.

The diagram is based on the supply-demand graph which Professor Kruger describes in his article. It really consists of two such graphs placed back to back. On the vertical axes we read the wage in dollars per man-hour; on the horizontal axis we read man-hours, which increase positively *in both directions* from the origin. The two panels have been separated so that we can show the differences between wage-rates in the space between the two vertical axes. The diagram implicitly assumes that both the "schooled" and the "unschooled" work the same number of hours per year, and that nobody ever earns special overtime rates. If these assumptions are not true, the diagram cannot be converted directly into earnings per year. However, these assumptions are made only to simplify the graph. They are not important for the basic point it illustrates.

In the diagram the *D* lines represent demands for labour and the *S* lines represent supplies. Since a profit-maximizing private employer or a cost-minimizing government employer will not hire a worker unless his work is worth at least the wage rate, these demand curves reflect the productivity of "schooled" and "unschooled" labour. The supply curves reflect individual preferences about work and leisure, together with the available stock of each kind of human capital, and the earnings in alternative employments. It is assumed that there is only one kind of human capital: "schooled". The rest of the population is "unschooled," supplying only raw labour. The "schooled" can work in "unschooled" jobs but the "unschooled" are excluded from "schooled" jobs. Finally, the number of "schooled" is assumed to be small relative to the number of "unschooled". These assumptions are logically required if we are to draw the diagram as we have drawn it, but like the assumptions of the last paragraph they are not essential to the point it makes.

The right hand part of Figure 6-1 shows demand and supply conditions at present, and in some future year, for the "schooled". D_{s1} and S_{s1} are present demand and supply; D_{s2} and S_{s2} are future demand and supply. The left-hand part shows conditions in the market for the !!unschooled". D_{u1} refers to the present, and D_{u2} to the future. S_u applies in both periods. In this part, supply and demand curves do not have their usual slopes because the horizontal axis reads from right to left, not from left to right.

The present unschooled wage rate is \$$W_1$. The schooled earn \$$P_1$. The present wage-differential is \$$G_1$. Let us assume that by the future date we have in mind, there will have been autonomous changes in the demands for both kinds of labour. Technical change or new government programs might be the cause. In the absence of a new training scheme to increase the number of "schooled", the wage for "schooled" will rise to \$$P_2$, the wage for "unschooled" will fall to \$$W_2$, and the wage-differential will rise to \$$G_3$. But we have in mind a particular training *scheme* which would increase the number of "schooled" between the present and the future year in question, shifting their supply

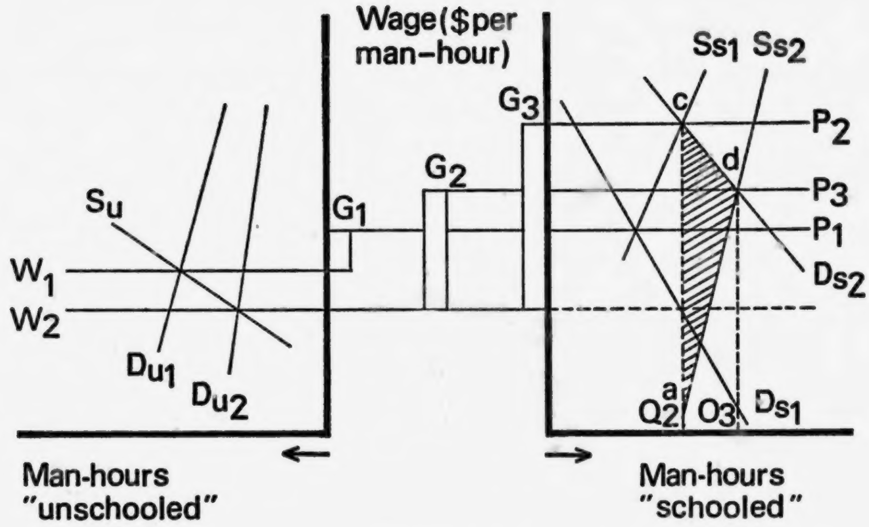

Figure 6-1

curve from S_{s1} to S_{s2}. Because the number of "schooled" will still be very small relative to the number of "unschooled", we do not need to change the supply of "unschooled", S_u. In that future year, the input of schooled man-hours would be higher by the amount (Q_3-Q_2). The training scheme would allow an increase in output which is measured by the area between D_{s2} and S_{s2} over this range. The appropriate area is shaded in Figure 6-1. It is the triangle *acd*.[29] This is clearly less than the amount G_3 (Q_3-Q_2) which we would get if we multiplied future differentials in the absence of the scheme by the increase in man-hours which the scheme permits. But this approach need not concern us, because it is obviously wrong in principle. Our triangle is larger than the figure we would get if we used present differentials, but we would not want to use them either because we know that, in our diagram, we have assumed an autonomous change in labour demand which would tend to widen differentials. The triangle may or may not be larger than G_2 (Q_3-Q_2) —the logically appropriate measure if we work from wage-differentials which will accompany the educational scheme we are considering.

Thus the wage-differential approach may or may not give the right answer, even if we remember to use future differentials. On the other hand, the geometry of supply and demand is such that the approach is not hopelessly biased in one direction or the other. One might even expect to get things roughly right most of the time. This line provides the justification for the cost-benefit calculations of this paper. The reader who finds it insufficient should discard the whole approach. Ideally one would like to know exactly where the supply and demand curves will lie at each relevant future date. But in the nature of things we can never know their positions. Working on differentials, we can at least begin from present data. These are reasonably complete, and more data could be gathered to fill gaps.

It might or might not be correct to forecast differentials on the basis of past trends.[30] These trends were produced by the many things which have shifted demand curves and supply curves, among which may be changes in the relative strengths of employers and employee associations. Underlying these changes were alterations in migration, taxation, techniques of production and the prices of other productive inputs, together with the output of our own educational system itself. Unless the analyst believes that all these things will continue to change in the future as in the past, he cannot accurately forecast the future changes in differentials on the basis of present differentials and trends. On the other hand, if he knows about these past trends, and about their causes, he is in a much better position to forecast differentials in the future, when things may be different.

The Cost Side

After the complexities of benefit calculations, costs seem blessedly easy. The social costs of education are partly direct and partly indirect. Direct costs arise because schooling demands resources—teachers, buildings, equipment, books and sometimes travel. Indirect costs arise because a person usually cannot work full time while he is in school.

From the person's point of view, some income or leisure is almost always foregone by attendance, even if one can work part-time. From society's point of view, output is foregone in a full-employment economy but not otherwise. Thus the analyst must remember output foregone, but he need include it only if he expects full employment of the relevant age and skill group during the period of schooling. If the educational project is a small scheme, output foregone can be approximated by the earnings of the next-lowest educational group of similar ability. Thus the output foregone in an engineering program is the earnings of high-school graduates of comparable economic ability. If the project is a large scheme or an entire system, this calculation will be incorrect, because the project itself will affect the relative scarcity, and therefore the earnings, of this next-lowest group. Further, if we use the average earnings of the next-lowest educational group to measure income or output foregone at higher levels, we ignore the fact that in this group are some more able and better-paid people. This is probably the right group to use for comparison, because it is more likely to have the necessary ability for higher studies. But we cannot detect it. Therefore, when output foregone is greater than zero it is probably always higher than the figures can show.

With respect to direct costs, our major problem is to decide how each sort of human capital is to be produced: what will be studied, how each subject will be taught, who the teachers must be and what equipment must be provided. These decisions fix the resource requirements per pupil, and also the need for each kind of resource—labour, capital, land, materials, books and so on. They may also influence the prices of teaching services, the most important input.

There are subtle and obscure interconnections between direct cost and educational benefit, both measurable and immeasurable. One can, for instance, cheapen the production of human capital by omitting extraneous education and by adopting the least-cost methods of instruction. But educators usually believe, in effect, that external benefits and consumption benefits will then also fall. Further, they also think that dropout rates are likely to rise, raising the cost per graduate. This may happen because slow learners and fast learners will both receive less instruction. The result would be failure for more of the slow and boredom for more of the bright. Economizing could even reduce the future value of the work the human capital does, either by giving the worker too few skills or by endowing him with unadaptable skills. The educational planner must explore these awkward matters. He must not assume that the cheaper is necessarily the better. On the other hand, he must not assume that it is always better to [illegible] more rather than less. In principle, these are factual questions about which one could receive numerical answers. In fact, at least for the present, one may have to trust the informed guesses of the educators.

An Algebraic Summary

We can summarize the cost and benefit calculations in elementary algebra. Equations 1, 2 and 3 do this. The result adds nothing to the argument of the paper, and nothing is done with the equations, which are no more than a compact restatement. Nevertheless, they may be useful for reference.

$$1. \quad C_i = \sum_{t=1}^{n+m} \frac{W_tT_t + (r+d)K_t + l_tL_t + m_tM_t + B_t + t_t + E_te_t}{(1+r)^t}$$

That is, cost equals the sum for *n+m* years, discounted at the social rate of discount *r*, of: teachers' salaries, capital charges, depreciation, rent, supplies, books, education-related travel costs and output foregone.

$$2. \quad B_i = \sum_{t=1}^{n+m} \frac{N_t(g_{it} - O_t) + X_{et} + X_{nt} + C_t}{(1+r)^t}$$

That is, benefit equals the sum for *n+m* years, discounted at the same social rate of discount *r*, of: net increase in earnings plus external economic benefits plus external non-economic benefits plus consumption benefits to the schooled.

$$3. \quad R_i = \frac{B_i}{C_i}$$

Equation 1 is a cost equation. Equation 2 is a benefit equation. Equation 3 is the cost-benefit ratio. The benefit equation rests on two simplifying assumptions: that income differentials approximate differences in productivity, and that any increase in employment results solely from the educational project in question. Benefits and costs are compared at the time the training will begin—that is, before the course has been started. All consumption benefits are included on the benefit side, whether they come during the course or after it is finished.

All the equations use the social rate of discount to discount future benefits and to accumulate costs. This rate is the percentage by which *society* undervalues the future. If people in general think that \$1.05 tomorrow is neither more nor less valuable than \$1.00 today, the social rate of discount between tomorrow and today is 5 per cent. This rate may or may not correspond to an observable market rate of interest. Further, it may be different for different people. Ideally, cost-benefit calculations should use a rate which the government fixes in its capacity as executor of the "popular will". However, the analyst will wait in vain for any such rate to descend from government into his office. Therefore, he is likely to want to work out various calculations, in each of which he makes a different assumption about the rate.

The rate of discount will affect the cost-benefit ratio. The higher the rate, the smaller the ratio, other things being equal. Further, a change in the rate may change the ranking of various educational schemes. Suppose that one scheme involves a very long training period, or that its benefits are long deferred, while another involves a short training period and smaller but quicker payoffs. The former scheme could easily have the higher cost-benefit ratio at a low discount rate, but the lower ratio at a high discount rate.[31]

The equations calculate benefits and costs for a point in time before any costs have been incurred. If the analyst wants to make the comparison for the date at which formal training is completed, the algebra will look a little different, but nothing essential will be changed.

The various items in these equations can be grouped into three classes. The first consists of things which cannot be observed at all. These are the consumption benefits (C_t), the external economic and non-economic benefits (X_{et} and X_{nt}) and the social rate of discount (r). The second consists of things which are the results of, or subjects for, conscious educational decision. These are the rate of depreciation (d), the number of pupils (E_t) and teachers (T_t),[32] the physical educational plant and its land requirements (K_t and L_t), the length of the course (n) and the inputs of materials and books (M_t and B_t). The third consists of things which can be observed or forecast on the basis of market relationships. These are travel costs (t_t), the length of working life (m), the number of scheme-produced workers

Where C_i = cost of scheme
B_i = benefit from scheme

I Things which Cannot Be Measured

r = social rate of discount
C_t = consumption benefit
X_{et} = external economic benefits
X_{nt} = external non-economic benefits

II Subjects for Conscious Educational Decision

T_t = number of teachers
d = rate of depreciation
K_t = capital input
L_t = land input
M_t = supplies input
B_t = books' cost
n = length of course, in years
E_t = annual enrolments in course

III Things Observable or Forecastable

W_t = average annual wage of teacher
l_t = rent
m_t = unit cost of supplies
e_t = output foregone through having one pupil in school
B_t = books' cost
t_t = education—related travel costs
g_{it} = average annual earnings of occupation under study
N_t = number of scheme-produced workers at work
m = length of working life, in years
O_t = average annual earnings on next-lowest educational level

at work (N_t), earnings of the occupation under study (g_{it}), earnings of the next-lowest educational level (O_t), output foregone (e_t), wages of teachers (W_t), rent (l_t) and the unit costs of materials (m_t).

Some of the items in this third class—W_t, g_{it} and e_t—will be affected by the educational scheme itself. Decisions about items in the second class, the subjects for educational decision, will affect W_t, g_{it}, X_{et}, X_{nt} and C_t. External economic effects, external non-economic effects, consumption effects and eventual earnings of the educated will all be larger, and the attrition of beginners will be smaller, when more resources are provided per pupil. The higher the teacher-pupil ratio (that is, the more teachers per scheme of given enrolment), the higher will be the teachers' wages at least in the short run, because the demand for teachers will be larger. The larger the scheme (that is, the larger its enrolment), the lower will be the eventual wage of its graduates.

If other educational schemes are contemplated, and if their outputs are expected to be close substitutes for or complements to the kind of labour which is under study, these effects should be allowed for in the forecasting of g_{it}. For example, if technicians and engineers are substitutes for one another, a technical training scheme will tend to lower the wages of both engineers and technicians; if technicians and engineers are complementary in production, however, a technicians' training scheme will tend to raise the wages of engineers while lowering the wages of technicians. The larger the total educational effort, the higher will be the output foregone during education, because the effort is increasing the relative scarcity of the next-lowest-schooled workers. Teachers' wages in any particular scheme will vary inversely with teacher-training enrolment, and positively with other enrolment and with teacher-pupil ratios.

Common sense and educational experience allows us to state the direction in which these various interdependencies operate. If one is prepared to make sufficiently strong assumptions—for instance, that all the relationships are linear—one can write complicated equations for X_{et}, X_{nt}, C_t, g_{it}, e_t, W_t, O_t and attrition. We can even substitute the results into our equations 1 and 2. But the operation is rather pointless. The resulting expressions cannot be simplified very much, and they contain a very large number of utterly unobservable coefficients. Even if they have computer facilities, the educational planners are unlikely to use these complex formulae, because they cannot hope to estimate all the coefficients which would be needed. One must settle for a lower order of precision.

On the cost side, one can keep things manageable by using current financial experience in the schools. On the benefit side, one can start from present income differentials, adjust them on an *ad hoc* basis for the future and keep external benefits and consumption benefits for qualitative consideration.

Choosing the Best Plan

In earlier sections we saw that an educational scheme or system should, at least, yield benefits in excess of its cost. It might also be asked to meet more rigorous tests, to yield as well as physical investment, or as well as some other government project. If two or more schemes or systems pass these more rigorous tests, we would want to choose the one whose cost-benefit ratio is highest. Given our algebra and enough data, this should be easy. Unfortunately, it is not. In this section we see why.

Suppose that two educational schemes or systems are markedly different from one another. They will have different effects upon the relative scarcities of different kinds of labour. In turn, relative wages and prices will be affected. For each alternative educational project, therefore, it is logically necessary either to assume or to generate an appropriate set of input and output prices. Each resulting scheme or system will then be calculated in terms of its own prices. Where two systems are similar, or where two schemes are small relative to the total educational pattern, the prices will generally be nearly identical. The results, the cost-benefit ratios, can then be compared in a relatively straightforward way. But if there are marked differences between two systems, or if two schemes are large relative to the total picture, the price problem is important and perplexing. Each project has been worked out in terms of its own prices, and each cost-benefit ratio is expressed in these prices. Therefore the cost-benefit ratios cannot be compared with one another. Though both seem to be in the same units—dollars of benefit per dollar of cost—they are actually in different units, because a dollar represents different real things when relative prices are different.

As well as the problem of prices, there is the problem of distribution. Each educational scheme or system implies a particular distribution of burdens and benefits. Consider any particular arrangement for taxing and spending. It will distribute benefits to some persons and impose costs on others. Another scheme is likely to distribute both benefits and cost differently.

The same is even more true of educational systems. The problem can be illustrated if we consider three sorts of system: the "democratic", the "elitist" and the "stimulated".

In the democratic system, the authorities provide a place in each level and each stream for any qualified person who presents himself at that level and in that stream. In an elitist system, places are deliberately limited at each level. In a stimulated system, governments deliberately encourage people to attend school by means of new tax concessions, direct student aid or fee cuts. The stimulated system is likely to produce the greatest reduction in the disparity between earnings at various levels of schooling, because it will have the biggest effect on the relative supply, and thus on the relative earnings of the well-schooled. The elitist scheme will have the smallest effect on this relative supply and relative earning, thus leaving a wider differential in earnings. The democratic scheme will fall somewhere in the middle. Further, output foregone per student will be lowest with the elitist scheme and highest with the stimulated scheme, because the former will leave the largest labour supply at each lower level of schooling and the latter will leave the least. Therefore, it is almost certain that the calculated benefit-cost ratio will be higher for the elitist than for the democratic system, and higher for the democratic than for the stimulated. The analyst may be able to reverse the situation by considering immeasurables: consumption benefits, external effects and oddities in the distribution of economically relevant ability. But he may still find that the elitist scheme looks like a better economic bet than the democratic. He will then want to note the distribution of income which each scheme produces. The elitist will be the least egalitarian, and the stimulated scheme will produce the greatest equalization of income, other things being equal.

The problem of income distribution has no scientific answer; one wants the distribution one wants, and that is that. In educational planning it is the government's wants which usually rule, and in our sort of country the educational planner should be governed by these. However, he must give enough information so that the government really knows what each alternative will produce. For this reason, the planner must emphasize the distributions of income which his alternative plans will produce.

Though the problem of prices has nothing to do with likes and dislikes, it also has no scientific answer. During the past twenty years, the "new welfare economics" has explored the problem thoroughly.[33] The conclusion is as follows.

If we assume that distributional effects do not matter, and if we also assume that all social costs and benefits have been included in the calculations at the appropriate prices, we can sometimes determine the economically best policy, but not always. Suppose we get a higher cost-benefit ratio for one scheme than for another, whether we calculate in terms of one set of prices or in terms of the other. Then, distributional questions aside, the first scheme is unequivocally better. In terms of either of the two price sets, the first scheme could satisfy all the needs that the second could satisfy, and still have some output left over. But what if one program ranks first in terms of one price set, and second in terms of the other? Then we cannot tell which scheme is economically better.

For educational planning the implication is clear. The planners must recalculate ratios for each educational scheme or system as many times as there are alternatives, each time using a set of prices from one of the other alternatives. The result will be several rankings, as many rankings as there are alternatives. If one scheme comes to the top of all the lists, it is unequivocally best and should be chosen, unless it leads to an objectionable distribution of burdens and benefits. If none comes to the top of all the rankings, then economics cannot tell which is best. But the calculations may nonetheless reveal that some are unequivocally worse than others, and they may also show that within pairs one is definitely better than another. When none ranks highest in all the rankings, choice might be made on the basis of distributional factors; one might choose the one which had the most egalitarian distribution of benefits, or one which resulted in the greatest equalization of incomes, for instance. If such considerations are not thought important, or if they do not give a definite answer, then the authorities can choose a scheme or system at random, secure in the knowledge that depending on the way the calculation is performed, different schemes or systems may seem to be best. The problem is not one of data; it is a problem of oddity in the world.[34]

Since many schemes and systems are possible, and since each may have to be recalculated in terms of the prices of the others, the benefit-cost analyst faces a formidable problem of calculation. Indeed, until recently the whole approach would probably have been labelled "impracticable" for this reason. Today, however, the computer can do these calculations quickly and can explore the relevant alternatives.

Richard Judy and Jack Levine have already shown that a simulation model is helpful if one wants to study the cost-implications of an educational program.[35] Indeed, given the complex interconnections of any present-day educational system, such a model is probably essential, if one is to make accurate estimates of total costs or incremental costs for any particular program. The Judy-Levine model actually applies to one faculty of one university. In principle, however, one could construct a model for the entire educational system of a province. In such a model, one could experiment with different assumptions about desired outputs, probable enrolments, staff-student ratios, resource-student ratios and other input and output assumptions, deriving the cost implications of each set of assumptions. One could also discover the *true* additional cost of extracting more of specific sorts of graduate from an educational system of specified structure. In principle, too, one could incorporate the Judy-Levine type of model, which explores only costs, into a larger model which also explores social benefits. The resulting computer simulations would reveal the social benefits and social costs for each educational scheme and for each set of input assumptions—staff-student ratios and so on.

All this is much more easily said than done. In practice, one difficulty might be the capacity of the computer. However, progress in computer technology is so rapid that any such difficulty is bound to pass. Much more serious are the difficulties in determining the desired pattern of educational outputs and in measuring the social benefit from each kind of human capital. The former difficulties arise in manpower forecasting, and the latter on the benefit side in cost-benefit analysis. The computer cannot eliminate the difficulties. But its logic may force us to think more rigorously about them. And its arithmetic power certainly allows us to explore the implications of different assumptions about things we don't know or can't predict. As we have seen, such things are very numerous in cost-benefit studies. Without a computer, the planner is likely to feel that he has done his job if he has found the implications of one set of assumptions. Yet many sets are possible, and rational educational choices can be made only after several have been compared. On the other hand, the computer cannot solve the problems of data, prediction and permanent uncertainty which have been so strongly stressed in this section. It can merely help us to live with our ignorance.

Summary

In this section we have explored the methodological problems of cost-benefit comparisons in educational planning. We have seen that this approach is not easy, but that it is not impossibly difficult. We have also seen that educational planning is closely linked with the study of labour markets. You cannot make educational plans without knowing about present and future market developments, as these are reflected in the earnings of the several occupations. On the other hand, the labour economist cannot fully understand what is happening in labour markets unless he knows what the educational system is doing, and he cannot forecast employment or earnings unless he knows what it will do. Educational planning is too important to be left to the educationists. But labour markets are too important to be studied only by the labour economists.

Much of the section has been gloomy, because it has examined the difficulties of cost-benefit analysis. Fortunately, we can conclude on a somewhat more cheerful note. To a large extent the problems of educational investment planning are common to any investment planning. Cost-benefit analysis is difficult largely because we do not know the future. Neither does the private businessman when he builds a new plant or buys a new machine. Yet he is able to decide whether or not to build or buy. In other words, all investment is based on imperfect uncertain calculations about the unknown future. Yet the calculations can help us toward better choices, in educational investment as in other investments.

AN EXAMPLE OF BENEFIT-COST CALCULATION

Having looked at the methodology, we can usefully turn to an example of cost-benefit calculation in practice. The results are based on actual data of the recent past.[36] They are, therefore, average cost-benefit ratios, not the ratios for new schemes or systems that educational planners need. Further, they are the products of approximations which were needed to bridge some of the gaps in the data at the time the calculations were made. Some of these gaps have since been filled. The 1961 census provides better information about earnings in relation to schooling. The published cost data have also improved. For instance, one can now allow for summer earnings in the estimation of foregone output. These calculations are offered not in the belief that they are perfect, but rather to show how one proceeds, and in the hope that their imperfections will stimulate better data-gathering and better calculations, especially by the educational authorities. The outside scholar cannot hope to make the accurate cost-benefit studies which educational planning requires, because some data will never be in the public domain and because educational cost-benefit analysis must be so closely linked with other aspects of educational planning. But he may suggest what data are needed, how to use expert opinion outside the department and how to proceed with the calculations themselves.

The direct social outlay on school facilities consists of the cost of constructing and operating the schools: salaries, supplies, maintenance, equipment, construction outlays and interest on the capital employed in the school system, together with private outlays on books and necessary travel. Most of these things are included in the official compilations of school expenditure data which are prepared by provincial and federal governments; some are easily available from other sources. But there are no usable data on the capital employed in the school system. Published spending data include "debt service", but this item excludes interest on capital not represented by currently existing debt and includes current repayment of this current debt; the spending data also include spending from current revenues on capital purposes, and they do not include any imputed interest on this spending. Thus *in any particular year* the reported spending of schools and universities will represent the social cost of schooling *in that year* only by accident. *Over a period of many years*, all construction outlays are included, either as capital spending from tax revenue or as repayment of borrowing, but the social cost is systematically understated, because interest is charged only on that part of the schools' and universities' capital stock which is financed with borrowed money. Further uncertainties arise about depreciation of school assets. A sizeable but unknown fraction of current school maintenance represents the replacement of depreciation, obsolescence and capital consumption, which are nowhere calculated as such. To include both depreciation and the cost of capital goods in costs is to double-count and thus to overstate the social cost of schooling. Logically one should exclude that part of maintenance which represents depreciation. While one could guess at a plausible figure, one cannot determine what the right figure might be. Thus the present data overstate true costs by including some depreciation, and understate true costs by excluding books, travel and some interest on capital. Fortunately, costs of instruction and supplies bulk so large in the existing data that the net distortion from these two offsetting distortions is probably small relative to the apparent costs which present data seem to reveal. Therefore, though the published data are imperfect, they probably give a close approximation to true social costs of schooling. However, it is important to publish better data on these costs. Present data do not tell us all we want to know. One hopes that the educational authorities have better data for their own internal uses.

In Tables 6-1 and 6-2 present values of typical income differentials are compared with the costs of professional training, under various assumptions about social rates of discount and about true social costs. The figures in these tables are *not* true social cost-benefit ratios, because both the costs and the benefits are imperfectly measured by our basic data. On the cost side, as already noted, we have not been able to impute a rate of return on capital, or a depreciation figure; though we have made a crude allowance for these, our cost estimates are therefore too firmly based on the school and university bookkeeping conventions, which do not include all the resource costs of schooling. Further, we have not been able to allow completely for the different costs of producing various sorts of professional persons, and our estimates of high school costs are probably too low, because the educational bodies have not yet managed to disentangle the various elements in their costs. We have not allowed for the output which students produce on summer and part time jobs. Our estimates of output foregone may be too low for some professional courses. The graduate who *could* have gone to medical school would almost always earn more than the average we have assumed. On the benefit side, our data impute to education some return which is properly due to innate ability, and some slight return which is earned not by human capital but by the property which the educated own.

TABLE 6-1

Ratio of Present Value of Income Differential to Present Value of School Operating Cost, 1959, Canada

Discounted and cumulated at 5%		*Discounted and cumulated at 10%*	
Lawyers	16.6	Consulting engineers and architects	7.7
Consulting engineers and architects	15.9	Lawyers	7.6
Elementary teachers	14.5	Elementary teachers	7.4
Dentists	13.1	Males completing only high school	6.5
Males completing only high school	13.4	Females completing only high school	6.2
Females completing only high school	12.8	Dentists	6.2
Accountants in professional practice	12.0	Accountants in professional practice	5.7
Doctors	11.6	Doctors	4.4
Baccalaureate engineers (a.s.)	9.3	Baccalaureate engineers (a.s.)	4.2
Baccalaureate engineers (c.d.)	7.9	Males completing university	3.9
Males completing university	7.8	Baccalaureate engineers (c.d.)	3.8
Baccalaureate scientists (a.s.)	6.1	Baccalaureate scientists (a.s.)	2.7
Engineers with M.A./Ph.D. (a.s.)	5.5	Secondary school teachers	2.5
Professors	5.1	Baccalaureate scientists (c.d.)	2.4
Secondary school teachers	5.1	Professors	2.3
Engineers with M.A./Ph.D. (c.d.)	4.9	Engineers with M.A./Ph.D. (c.d.)	2.1
Baccalaureate scientists (c.d.)	4.8	Engineers with M.A./Ph.D. (a.s.)	2.1
Scientists with M.A./Ph.D. (c.d.)	3.8	Females completing university	1.8
Females completing university	3.6	Scientists with M.A./Ph.D. (c.d.)	1.6
Nurses	2.0	Nurses	1.0

a.s.—calculated from age-specific differentials
c.d.—calculated from constant differentials

TABLE 6-2

Ratio of Present Value of Income Differential to Present Value of Sum of School Operating Cost and Output Foregone, 1959, Canada

Discounted and compounded at 5%		*Discounted and compounded at 10%*	
Consulting engineers and architects	6.4	Consulting engineers and architects	3.1
Lawyers	5.3	Elementary teachers	2.5
Elementary teachers	4.9	Lawyers	2.4
Doctors	4.6	Dentists	2.0
Dentists	4.2	Doctors	1.8
Baccalaureate engineers (a.s.)	3.9	Accountants in professional practice	1.8
Accountants in professional practice	3.8	Baccalaureate engineers (a.s.)	1.6
Baccalaureate engineers (c.d.)	3.2	Baccalaureate engineers (c.d.)	1.4
Males completing university	2.6	Males completing university	1.3
Baccalaureate scientists (a.s.)	2.6	Baccalaureate scientists (a.s.)	1.0
Females completing high school	2.0	Engineers having M.A./Ph.D. (a.s.)	0.9
Baccalaureate scientists (c.d.)	2.0	Engineers having M.A./Ph.D. (c.d.)	0.9
Engineers with M.A./Ph.D. (a.s.)	2.0	Females completing high school	0.9
Engineers with M.A./Ph.D. (c.d.)	1.9	Baccalaureate scientists (c.d.)	0.9
Secondary teachers	1.6	Scientists with M.A./Ph.D.	0.8
Professors	1.6	Secondary teachers	0.8
Females completing university	1.5	Professors	0.7
Scientists with M.A./Ph.D.	1.5	Females completing university	0.7
Males completing high school	1.1	Males completing high school	0.5
Nurses	0.7	Nurses	0.3

a.s.—calculated from age-specific differentials
c.d.—calculated from constant differentials

Though our assumed training times are "typical", they did not apply to all those who are now earning the incomes on which our benefits are calculated. Further, our income differentials may reflect market distortions and imperfections, which help to

TABLE 6-3
Assumptions

Group	Direct cost Yrs.	Direct cost $ per yr.	Output foregone Yrs.	Output foregone $ per yr.	Constant differential ($)	Age-specific differential ($)	Working life (years)
Accountants	6 @	1390	4	2770	5725		41
			2	3495			
Doctors	7	2000	4	2770	10341		40
			3	3495			
Dentists	6	2000	4	2770	6340		41
			2	3495			
Consulting Engineers and Architects	5	2000	4	2770	9389		42
			1	3495			
Lawyers and Notaries	6	1390	4	2770	8099		41
			2	3495			
Nurses	2	1035	2	2016	251		45
Professors	7	1390	4	2770	3532		40
			3	3495			
Elementary teachers	2	1035	2	2016	1810		45
Secondary teachers	5	1390	4	2770	2362		42
			1	3495			
Male high school graduates	4	230	4	2666	783		47
Female high school graduates	4	230	4	1273	743		47
Male university graduates	4	1390	4	2770	2812		43
Female university graduates	4	1390	4	2016	1287		43
Scientists with M.A./Ph.D.	7	2000	4	2770	3720	2760-6568	42
			3	3495			
Engineers with M.A./Ph.D.	7	2000	4	2770		3210-7716	34
			3	3495	4620		42
Baccalaureate scientists	4	2000	4	2770	2470	1710-4616	43
Baccalaureate engineers	4	2000	4	2770	4020	2560-7516	43

preserve high returns to human capital in some activities while depressing the return on human capital in others. Finally, we have made no effort to add any allowance for consumption benefits or external benefits, important though these are usually thought to be.

Notes

Output foregone is measured by 1959 mean earnings of next lowest level of schooling; earnings of males under 29 are used in all cases except elementary teaching and nursing, for whom mean incomes of female high school graduates were used. The constant differentials are the differences between average pre-tax 1959 incomes and average pre-tax 1959 incomes of the next-lowest educational group. In almost all cases the averages are means; in a few cases, where only median earnings data existed, differentials were computed from medians. In all groups except elementary teachers and nurses, the *earned* incomes of *males* were employed in calculation of differentials. Earnings of elementary and secondary teachers were calculated for 1961 to 1962 and carried back on trend-lines to the calendar year 1959. University teachers' median earnings are the mean of medians reported by seventeen universities for 1958 to 1959 and 1959 to 1960; they include salary income only. Age-specific differentials were calculated for scientists and engineers by matching their earnings in each "year from graduation" with age-specific earned incomes of male high-school graduates. Because the basic data were insufficient, this calculation could not be carried beyond the thirty-fourth year of working life in the case of engineers who have higher degrees. Incomes of accountants, medical doctors, dentists, consulting engineers and architects, lawyers and notaries, and nurses, are from *Taxation Statistics.* They include both property income and earned income, but the reported contribution of property income is small: 6.1 per cent for accounts, 4.8 per cent for medical doctors, 5.4 per cent for dentists, 9.8 per cent for lawyers and notaries, 6.4 per cent for consulting engineers and architects, and 5.1 per cent for nurses. Thus the differential should be a reasonably pure measure of earned-income differential; on the other hand, both earned income and property incomes are probably under-reported by some of these groups. Incomes of professors are from DBS, *University Teachers' Salaries, 1937-1960*; incomes of elementary and secondary school teachers are constructed from data in DBS, *Preliminary Statistics of Education, 1959-60 through 1962-63.* For all three groups, salary income alone is included; fringe benefits, earned "outside" income and property income are excluded. Data on scientists and engineers are from Economics and Research Branch, Department of Labour, *Professional Manpower Bulletin No. 9*; they appear to include earned income only, and they are much lower than the earnings of "consulting engineers and architects" because the *Taxation Statistics* category includes only a select group which is in private practice. Basic data on education-specific and age-specific incomes and earnings are from a sample survey conducted in early 1960 and reported in DBS, *Preliminary Statistics of Education, 1961-2* and elsewhere.

Costs of training are constructed from *Preliminary Statistics of Education, 1961-2*. Figures for 1961 to 1962 were used so as to take some account of depreciation and interest costs which are not fully included in school and university accounts. Per-pupil costs in teachers' colleges were arbitrarily applied to the training of nurses. Per-student costs were arbitrarily increased for doctors, dentists, engineers, architects and scientists, as a crude allowance for the higher but unknown current and capital per-student costs in these college faculties. Lengths of training are not identical in all parts of the country, nor within all professions; in our calculations we have used "typical" periods, which are probably appropriate in general, but some people train more rapidly or more slowly than we have assumed. We have not reduced output foregone to allow for part-time and summer earnings because there were no suitable data when these calculations were made.

On balance, the ratios in Tables 6-1 and 6-2 almost certainly understate "true" benefits relative to "true" costs; in other words, the social payoff is probably greater than our ratios suggest, especially in the educational and scientific professions where the external benefits of innovation and discovery are probably relatively great. In the following discussion, we shall talk about cost-benefit ratios and payoffs, but these terms are used only because they are brief; the reader should remember that the author has not actually measured the thing which the terminology might suggest has been measured. When discussing the tables, an attempt will be made to suggest how true social cost-benefit ratios might differ from our measured cost-benefit ratios.

Let us look first at the common characteristics of the two tables. It is obvious that there is no single rate of return on human capital and no single representative benefit-cost ratio. At 10 per cent discount, including both direct costs and output foregone, the range is from the nurses' rather pathetic 0.3 to the consulting engineers' 3.1. The range is so great, and the implicit internal rates of return are so diverse, that there is no sense in talking about "a" rate or "a" ratio. Further, at 10 per cent discount, half of the entries yield cost-benefit ratios of one or more, while most of the rest are barely under unity. Only a small markup for external effects, or a small writeoff of costs against part-time or summer earnings, or consumption benefits, would suffice to raise cost-benefit ratios for professors,[37] secondary teachers and most others—everyone, in fact, except males completing high school, and nurses. At 5 per cent discount, every entry yields a cost-benefit ratio which exceeds unity, except the nurses.

Some of these ratios are certainly misleading. Doctors probably do well partly because output foregone is understated. Elementary teachers place high because our calculation assumes a work life of over forty years, instead of the actual work life of less than ten. But because the earlier years of employment contribute disproportionately to the social payoff from an investment, elementary teachers would still appear to yield favourable returns on a more realistic calculation. Similarly, the return on women high school and university graduates is exaggerated because, lacking precise information, we have been obliged to assume an unrealistically long work life. On the other hand, the education of women is often asserted to be immensely valuable because it leavens the domestic lump, so to speak. If it actually yields such non-monetary social benefits, its true social cost-benefit ratio may well exceed our figures both at 10 per cent and at 5 per cent.

The strikingly low position of the nurses' ratio is not unexpected. A variety of evidence shows that, because nursing is still widely believed to be a "calling",[38] nurses are prepared to accept a relatively low money income. We also know that earnings are not sufficient to prevent substantial emigration of Canadian trained nurses.[39] Further, our calculation may exaggerate the social cost of nursing training, because we have probably overrated direct training costs and because the nurse-in-training does produce some social output during the period of her specialized education. We have omitted the external benefits of nursing services on the general level of health; on the other hand, our calculation exaggerates the social benefit from nursing training by assuming that all trained nurses work for forty-five years. It is hard to believe that in some sense the training of nurses is not "really" worth society's resources. Therefore, this very low cost-benefit ratio probably implies that society "exploits" its nurses, in the sense of paying them less than their services are "really" worth to society. The large emigration of nurses and the short average period of service should then be interpreted as signs that the non-monetary rewards are not sufficient to balance the scales and retain nurses in the profession, or in this country.

Most of the really high cost-benefit ratios are attached to guild-like professions which control their own entry, and in part control the number of students in training. Lawyers, dentists, doctors and accountants are all of this sort. This fact does not mean that our benefit calculations are wrong. All these people did work which was actually worth what they were paid. But if there had been more of them, or if they had not perhaps fixed prices for their services, the data would show a lower measured "benefit", reflecting a weakening in the groups' own market power. However, the cost-benefit ratios for other groups, especially scientists and engineers, for which no evidence of market power exists, are large enough to suggest that cost-benefit ratios in the guild-like professions would still be sufficiently high to justify social investment in their training. Further, to some extent all four of these professions probably generate external benefits which should be added to the monetarily measured benefits. Doctors in private practice help to raise the general level of health, thus generating social benefits which do not accrue directly to those who pay doctors' fees. To some extent the same is true of dentists, though the external benefits of dental practice may be more aesthetic than sanitary. The practice of law creates external benefits because it maintains the general rule of law, whose benefits are not entirely subsumed in the fees which clients pay. The same is true of accountants, without whose services a system of commercial capitalism could hardly function. Given these considerations, our cost-benefit ratios may give a fairly acceptable idea of the social gain from their training.

The cost-benefit ratios cast some light upon the question of the payoff from scientific and engineering training. While we are constantly told that we "need" more scientists and engineers, we are seldom told whether the provision of such expensive personnel is economically justified.[40] "Consulting engineers and architects" place extremely high on both our tables. But this is a very small and special group, consisting of engineers and architects who are in private practice. In 1961, only 7.2 per cent of the Labour Department's engineer sample was in "professional service".[41] Private industry employed 70 per cent of the total, and government and universities accounted for the remainder. The differential earnings of these engineers are probably free of the distortions, on either side of the market for their services, which buyers' or sellers' power might produce. Therefore their relatively favourable cost-benefit ratios show their training has probably been economically justified. To the measured benefit can be added the putative external benefit of the "sciencemindedness"[42] which their presence in the economy has helped to create.

It will be observed that for baccalaureate engineers the cost-benefit ratios are relatively high, and that they are higher for baccalaureate engineers than for engineers possessing higher degrees. This difference does not stem from the fact that the latter group is concentrated in government service and in universities; in 1961 private industry tended to pay such employees less than government, and only 5.7 per cent more than the universities.[43] It seems, therefore, that the baccalaureate training of engineers has paid off more handsomely than their postgraduate training.

However, perhaps the external benefits from research and development have been greater from further training than from the training of baccalaureate engineers. If this statement is true for engineers, it is surely also true for scientists, because the flow of new ideas and basic and applied research surely comes far more from those scientists who have higher degrees than from those scientists who have only bachelors' degrees. Indeed, in 1961, 15 per cent of the latter group were teaching in secondary schools, where opportunities for creative research were, to say the least, slender; 23.5 per cent of those with higher degrees were in universities, where the opportunities must have been greater.[44] Presumably both groups were equally likely to create "sciencemindedness". Therefore, the benefits from the further training of scientists should probably be marked up more for external benefits than the measured benefits from the training of scientists to the baccalaureate level.

There is some probability that really highly trained research scientists and engineers enjoy their work. Further markup should be added to allow for this. A 16 per cent markup would be enough to eliminate the gap between the measured cost-benefit ratios of the two groups of scientists.

The numbers of our tables make the more highly trained scientists, like the more highly trained engineers, *appear* less socially productive than those who have been less extensively trained. However, even on the most conservative costing and discounting assumptions, the measured cost-benefit ratio for all sorts of scientific and engineering training is 0.9 or more, and it exceeds unity for all baccalaureate scientists and engineers. It seems, therefore, that, even on a narrow-minded calculation, the benefits from most scientific and engineering training have exceeded the social costs of that training. The future benefits from expansion, of course, might be quite different—much higher, or much lower.

The educational professions themselves present a rather mixed picture in Tables 6-1 and 6-2. Because elementary teachers teach for relatively short periods, their cost-benefit ratio is not as high as it appears in our tables. But because their training is so cheap, and because women tend to earn less than men at all levels of schooling, it is probably substantially higher than the cost-benefit ratios which belong to secondary teachers and college professors, most of whom are men. At 10 per cent discount rate and with full costing of output foregone, only the training of elementary teachers appears to have been remunerative. At 5 per cent, or on an operating-cost basis, for all three sorts of teacher the cost-benefit ratios exceed unity. *Ideally*, one should be able to take these cost-benefit ratios largely at face value, because, teachers and professors are paid out of the public purse, whose beneficient controllers, knowing the "full" social benefit of instruction and naturally not wishing to exploit its purveyors, would of course set instructional salaries accordingly. *In fact*, salaries may not always have been set in this fashion; therefore, teachers' salaries may reflect some exercise of governmental market power. Further, teachers' associations which often set floors for salaries may have had effective bargaining power too. Thus it is hard to be sure just what teachers' salaries reflect. To some, the market seems to be reasonably close to pure competition. However, this point cannot readily be proved. In any event, we should recall the non-monetary benefits to the instructors themselves, which are not included in our measured benefits and which at the university and higher secondary levels are doubtless substantial. When these are added, and when allowance is made for putative exercise of monopsony power, cost-benefit ratios are probably above unity for the secondary teachers and professors, even at 10 per cent discounting and full inclusion of output foregone. On other costing and discounting bases, all three kinds of instructor produce benefits in excess of their costs.

Table 6-2 shows that when output foregone is included as a cost, the production of female high school graduates has yielded a greater benefit per dollar than the production of male high school graduates. On the other hand, at the university level the training of males was substantially more "remunerative" than the training of females.

Though our numbers are unsatisfactory and our discussion is far from conclusive, probably we can safely assert that most sorts of formal education have yielded economic benefits considerably in excess of cost—unless society undervalues future benefits by substantially more than 10 per cent per year. However, the past is not the future. The experience of the past may not apply when new projects are mooted. Therefore, up to this point our discussion has not enabled us to assert that any *particular sort* of education should be *expanded* at the expense of some other sort. Nor can we assert that education *in general* should be expanded, at the expense of consumption, investment or other government programs. The latter assertion could be made if we could make reasonable guesses about benefit-cost ratios in new education, consumption, physical investment and other government programs. We also need more detailed and accurate information about the costs of particular educational tasks, especially in secondary schooling and in technical training. And we need to forecast the additional social benefits from each sort of schooling.

In this connection it would be extremely interesting to compare engineers, nurses and other technological professions with the relevant subprofessions—technicians, technologists, nurses' aides and such. Unfortunately, at present we know next to nothing about the income-differentials which result from the training of the subprofessionals, and we do not know nearly enough about the costs of training them. Such data are urgently needed if economic considerations are to influence educational planning. In Ontario, for instance, we have begun to expand technical institutes and we are starting to build community colleges. Very large sums are to be used for these new post-secondary institutions. Yet no one has tried to show the public whether the outlays are economically justified, in the sense that their social benefits will exceed their social costs. If one were to choose between university expansion and other post-secondary expansion on economic grounds, one would need to know the social cost-benefit ratios for both sorts of institutions. But we do not know whether the social benefit per dollar is greater in universities, in technical institutes, in community colleges or in some other sort of post-secondary institution.

CONCLUSION: THE PLACE OF COST-BENEFIT STUDIES AND MANPOWER FORECASTING IN EDUCATIONAL PLANNING

Having devoted most of this paper to cost-benefit studies, we may have given the impression that no other approach can be proper. In fact, cost-benefit analysis should be used in conjunction with other approaches—in particular, with manpower forecasting. While cost-benefit studies appear to have more general utility, there are large areas in which manpower forecasts are more useful. The two techniques should be seen as complements, not substitutes or competitors. We can usefully wind up this paper by sketching the proper tasks for each.

In a centrally planned economy where the government owns the means of production, there is little need for cost-benefit studies so long as the government states its output targets, and specifies the productive techniques it wants. By these techniques output will be produced in each target year. The levels of output and the productive techniques imply that the economy will need definite amounts of each kind of capital good, both physical capital and human capital. In other words, one would know how many of each kind of worker would be needed to reach the government's goal. From these data one could construct a manpower plan which would be meaningful and accurate. The manpower plan could be translated directly into an educational plan along standard lines.

If the government does not own the means of production, things can never be so tidily handled by the manpower planner. Whether or not the government draws up a long-range output plan, the actual choice of productive techniques in the private sector will rest with the private businessman, who will be influenced by the relative prices of the various inputs. This fact makes it *logically* impossible for a manpower forecast to yield precisely accurate forecasts of educational needs in such an economy, altogether apart from problems of data and forecasting. The quantities demanded of each sort of human capital will depend on relative wage rates and prices. Among the more important determinants of relative wage rates are the relative supplies of each kind of labour (or human capital). In turn, relative supplies depend largely on past educational efforts. Therefore, in forecasting the quantities demanded we are implying a particular pattern of wages, which in turn implies or assumes a particular educational effort. But it cannot be known whether or not the educational effort which the manpower forecast yields will, in fact, yield the pattern of relative wages which will produce the pattern of employment from which the educational effort was deduced. Therefore, one cannot believe the manpower forecaster who says that he can produce detailed and specific forecasts of manpower needs and educational needs. Nevertheless, manpower forecasts can be useful in the foreseeing of general trends. Even here, however, they are less useful than they seem at first, because the manpower forecaster must assume that he knows what the output of each industry will be, and how it will be produced.

In a mixed economy like our own, manpower forecasting finds its safest application within the public sector, whenever the government is the only employer, or the overwhelmingly most important employer, of a particular occupation. Consider teachers and health workers. The former work for school boards and universities which are tax-supported; the latter increasingly work for tax-aided hospitals and medical insurance schemes. For both sorts of worker, it is natural to construct a forecast of "needs". First one forecasts the group to be served —population in the case of health workers, or students in the case of teachers. Then, as a first approximation, one assumes that there is a best technique for providing the service. For health workers, the result is a doctor-population ratio or a nurse-population ratio. For teachers, one uses a pupil-teacher ratio. Using these coefficients, one obtains a "need" forecast which rests upon the fixed coefficients, upon the forecasted size of the group to be served and upon the government decision to give the group this service.

Yet even in the areas of health and education one should not take the manpower forecast at face value. One would want to compare the cost of the educational effort with its benefit. The forecast rests on assumptions about the right way to offer service, and the results are extremely sensitive to changes in these assumptions. Therefore, before the government commits itself to a particular coverage or to a particular coefficient, it would want to consider the total costs of the various alternative coverages and coefficients, comparing them with social benefits.

On the other hand, manpower forecasting can be a useful adjunct to the cost-benefit analysis of educational schemes or systems. As we have noticed, this analysis uses data on future earnings, which the analyst must somehow estimate. The task is easier if one explicitly employs a manpower forecast to integrate each set of assumptions one wants to make. The forecast does not yield an educational program; instead, it helps the cost-benefit analyst to make sensible guesses about earnings. First one forecasts the stock of each kind of human capital on the basis of the present stock, attrition rates, immigration and the output of some specific educational system. Next one forecasts the "demand" for each sort of human capital, on the basis of assumptions about output and technology. Confronting the one forecast with the other, one can guess where relative earnings will tend to rise and where they will tend to fall, compared with the present pattern. Since the cost-benefit analyst must make such guesses in any event, he is helped if he can make them within a conceptual scheme of some sort. For this purpose, the manpower-forecasting scheme seems to be the best available, even though its results do depend upon one's assumptions about future output and productive techniques.

It should eventually be possible to incorporate the manpower forecast into the cost-benefit analysis, building a single computable model which would calculate future income-differentials and then using these calculations to work out the cost-benefit ratios appropriate to the educational system which has been assumed in the calculation of the differentials themselves. Any such calculations would need strong assumptions about future technologies and demands for outputs. But the assumptions would be no stronger than those which manpower forecasters habitually use. And the model could readily be used to explore the implications of different assumptions. Perhaps it would be found, in the end, that large differences in the assumptions would make small differences in the cost-benefit results. Such an outcome would be impossible in manpower forecasting alone, where the results are very sensitive to small differences in the assumptions. But in cost-benefit calculations a movement on one side is sometimes found to accompany an offsetting movement on the other. Until a computable model is built, we will not know for certain. But the thought is an encouraging one, and it gives an optimistic note on which to end this paper of perplexities and uncertainties.

Appendix

Why are the rankings of cost-benefit ratios affected by the prices one uses in the calculations? The reason is not really very subtle, but it is not obvious. We can best explain it by using two simple numerical examples.

Suppose there are only two goods in existence, which are both the inputs and outputs of education. One is paper, and the other is eggplant. Imagine that we are comparing the costs and benefits of two educational schemes, whose effects are summarized in Table 6A-1.

TABLE 6A-1

Costs and Benefits for Two Hypothetical Educational Schemes

	Scheme One		*Scheme Two*	
	Paper	*Eggplants*	*Paper*	*Eggplants*
Benefits	30	50	60	45
Costs	20	40	56	25
Surpluses	10	10	4	20

Since eggplants and paper cannot be added, we must convert the two physical entities into some common unit before calculating any benefit-cost ratios. This is best done by using prices to get totals in terms of dollar values. Normally, of course, in the real world, we do not work from the physical units to the values; we have the values, and we must interpret these in terms of underlying physical realities. For this very reason, it is important to know just what the values mean in these underlying physical terms. To discuss the matter, it is easier to go from the physical to the value, although in the real world one does the reverse.

Assume that if Scheme One is adopted paper will be worth \$2 and eggplants \$1, while if Scheme Two is adopted the price of paper will be \$1 per roll and the price of an eggplant will be \$2. In terms of their own prices, Scheme One yields a cost-benefit ratio of 1.375, and Scheme Two yields a ratio of 1.41.[45] It seems that Scheme Two must be better.

But if we look at the physical cost-benefit ratios things are less clear. Scheme One yields 1.5 rolls per roll of outlay and 1.25 eggplants per eggplant expended. Scheme Two yields 1.07 rolls per roll and 1.8 eggplants per eggplant of outlay.[46] If eggplant is much more valuable, Scheme Two is the better; if paper is thought more valuable, Scheme One is the better. The prices of Scheme Two, in fact, value eggplant highly relative to paper in Scheme Two, and relative to eggplant in Scheme One. One must therefore ask oneself whether the specially favourable showing of Scheme Two in terms of overall cost-benefit ratios may not be the result of the value it gives to eggplant. We can check this by repricing each scheme in terms of the prices which go with the other.

When we carry out this repricing, we find that the cost-benefit ratio for Scheme One is now 1.33 and for Scheme Two the ratio is 1.17. The ranking has been reversed completely; now Scheme One seems better while in the first case Scheme Two seemed better. Which scheme is *really* better? We cannot tell, because outputs and prices are so different in the two cases.

Now consider Table 6A-2 which compares Scheme One with Scheme Three.

Assume that prices for Scheme One are unchanged, and that in Scheme Three paper costs \$1 per roll and eggplants \$2. Let

TABLE 6A-2

Costs and Benefits for Two Hypothetical Educational Schemes

	Scheme One		*Scheme Three*	
	Paper	*Eggplants*	*Paper*	*Eggplants*
Benefits	30	50	60	45
Costs	20	40	45	25
Surpluses	10	10	15	20

us calculate the cost-benefit ratios. Scheme Three yields a ratio of 1.58 in terms of its own prices and 1.43 with Scheme One's prices. Scheme One's ratios are 1.375 and 1.33. It is clearly better, whichever prices one uses, to choose Scheme Three.

Why does Table 6A-2 give a definite answer, while Table 6A-1 is uncertain? The key is in the physical cost-benefit ratios —eggplants per eggplant, and paper rolls per paper roll. Scheme Three has higher physical ratios for both products; Scheme Two has higher ratios for eggplants but lower ratios for paper than Scheme One. It follows that there is no valuation of products which would make Scheme Three inferior to Scheme One, but that the ranking of Scheme Two relative to Scheme One depends upon the valuation of the paper and the eggplants.

In the real world, any educational scheme yields many benefits and incurs many costs. Not all the costs can be related to benefits in the same simple way as in our examples, because many physical benefits have no corresponding physical costs, and vice versa. These can be brought into congruence with one another only if they are all valued. The size of benefits relative to costs will depend upon the valuations. When one scheme is better regardless of valuation, it will have the same overall superiority which we can see in simple physical terms when we look at Scheme Three.

NOTES AND REFERENCES

[1] Chapter 1, pp. 5-9.

[2] Compare the following summary with Schultz, T., "Reflections on Investment in Man", *Journal of Political Economy,* Vol. LXX, October 1962, Supplement, pp. 3-4. See also Johnson, Harry G., "Toward a Generalized Capital Accumulation Approach to Economic Development", mimeo. prepared for a conference on the residual factor in economic growth sponsored by the OECD. The definitive study is that of Becker, G., *Human Capital,* Princeton University Press, Princeton, 1965.

[3] Podoluk, J., *Earnings and Employment,* Dominion Bureau of Statistics (Catalogue Number 91-510), Ottawa, 1965, Table 20. Her data cover males aged 25 to 64 years, and are based on cross-section data. H. P. Miller has recently shown (*American Economic Review,* Vol. LV, September 1964, pp. 834-844)

that this method tends to understate lifetime earnings substantially.

[4] Podoluk, J., *Earnings and Employment, op. cit.*, Table 20. Data relate to males aged 25 to 64 years.

[5] Economic Council of Canada, *Second Annual Review*, Queen's Printer, Ottawa, pp. 91-92.

[6] There is a difference in costs because society spends on education without directly charging the students the full costs. On the benefit side, society may benefit more than the student because others receive benefits in addition to the benefit the student receives. See below, pp. 253 ff.

[7] For samples of the relevant rhetoric, see, among many other writings, Alberta, Royal Commission on Education, *Report*, Queen's Printer, Edmonton, 1959, Chapter 4; Quebec, Royal Commission on Education, *Report*, Queen's Printer, Quebec, 1963, I, pp. 60-64; Piggott, A. V., *Education and Unemployment* (Canadian Conference Study on Education, Conference Study No. 9), Ottawa, 1961?, passim; Organization for European Economic Cooperation, *Forecasting Manpower Needs for the Age of Science*, Paris, 1960, pp. 7-8, 30-31.

[8] To this should be added the fact that a larger educational effort automatically creates a new demand for highly skilled professionals, the teachers and administrators in the school system itself. However, because each teacher deals with many pupils in a career, this demand effect is always small relative to the eventual effect on supply. For an algebraic exercise on the point see Porter, R. C., "A Growth Model Forecast of Faculty Size and Salaries in United States Higher Education", *Review of Economics and Statistics*, XLVII, May 1965, pp. 191-198.

[9] Difference between median levels of schooling for all members of the managerial occupations; United States data from *Census 1960*, Canadian data from *Census 1961*. Canadian data relate to level of schooling attended, and American to level of schooling completed; therefore, the actual disparity may be slightly greater than this figure suggests.

[10] Meltz, Noah M., *Changes in the Occupational Distribution of the Canadian Labour Force, 1931-1961*, Economics and Research Branch, Department of Labour, Ottawa, 1965.

[11] See Bertram, G., *The Contribution of Education to Economic Growth*, Economic Council of Canada Staff Study No. 12, Queen's Printer, Ottawa, 1966, Appendix Table A-5. Bertram's estimate refers to male university graduates aged 25 to 64 who are members of the labour force.

[12] Bertram, G., *op. cit.*, pp. 35-36.

[13] *Ibid.*, p. 14.

[14] These percentages are calculated from census data which have been standardized on the basis of 1961 census definitions of occupations. Meltz uses 1951 definitions.

[15] Podoluk, J., *op. cit.*, Table 23.

[16] This percentage is the rate of interest which equates the individual's schooling costs with the financial benefit the schooling yields him during his lifetime.

[17] For a full account of the techniques of manpower forecasting, see Mehmet, O., *Techniques of Manpower Forecasting*, Centre for Industrial Relations, University of Toronto and Ontario Department of Labour, 1966.

[18] For a list of Canadian exercises in manpower forecasting, see Professor Meltz' paper, pp. 231-236.

[19] For examples, see Podoluk, J., *op. cit.*, and Wilkinson, Bruce W., "Present Values of Lifetime Earnings for Different Occupations", *Journal of Political Economy*, LXXIV, No. 6, December 1966, pp. 556-572.

[20] For further discussion of cost-benefit analysis see Professor Kruger, pp. 18-22.

[21] For a full listing see Weisbrod, Burton, *External Benefits of Public Education*, Industrial Relations Section, Dept. of Economics, Princeton University, 1964.

[22] These sentences are meant to show how life-adjustment education logically fits into the analysis. They are not meant to claim that the life-adjustment theorists are right.

[23] There are, or may be, immeasurable costs as well as benefits, from both private and social viewpoints. In principle these ought to be allowed for. If we force people to stay in school, we are, by definition, making them do something they would not choose to do, thus making them less happy than they would otherwise be. The educational process may create social unrest or personal discontent. Indeed, for a poor country it may be essential to balance the risk of social unrest against the gain from human capital formation. In Canada the common consensus seems to be that these costs are insignificant. Therefore, they are not discussed further in this paper. However, anyone can adjust a cost-benefit calculation to allow for them. Like the immeasurable benefits, these immeasurable costs can be handled either pseudoquantitatively or qualitatively—"pseudoquantitatively" because there is perhaps no objective or verifiable way to assign numbers or additive values to them.

[24] It is also possible to *calculate* a rate of discount which equates the stream of future dollar benefits with the stream of costs, from the standpoint of a single date. This second method yields an "internal rate of return". The first method yields a "cost-benefit

ratio", a ratio between discounted costs and benefits. A project will have a high cost-benefit ratio if it also has a high internal rate of return.

If the cost-benefit ratio is unity, the internal rate of return is the same as the rate of interest at which benefits and costs were discounted and compounded.

[25] See p. 247.

[26] The pupil-teacher ratio is defined in various ways for various purposes. Pupils are usually those students who are in actual full-time attendance, while teachers are full-time teachers. Part-time students and teachers can usually be converted into full-time equivalents.

[27] It is true that, by alienating some students and confusing others, college sometimes *reduces* earning potential. But these effects do not seem to be typical.

[28] This figure was assumed by Denison, W., *The Sources of Economic Growth and the Prospects Before Us*, New York, Committee for Economic Development, and by Bertram, G., *Economic Council of Canada*, Ottawa, 1966. There is no real evidence on the point.

[29] A lies so far below $\$W_2$ on the assumption that some "schooled" people would prefer leisure to employment in an "unschooled" occupation. If this is not the case, S_{s2} will cross D_{s1} above W_2, and A will lie above $\$W_2$ also. The triangle measures additional output because the area under the demand curve measures the value of the work which the schooled workers will do, while the area under the supply curve measures the value of the work or leisure in which they would otherwise be engaged.

[30] As surveyed in Meltz, *op. cit.*, which presents information on the differentials between the major occupational groups from 1931 to 1961.

[31] This reversal actually can be observed in the numerical example of the next section.

[32] And therefore the pupil-teacher ratio.

[33] For a reasonably up to date summary and commentary see Mishan, E. J., *Welfare Economics*, Random House, New York, 1964. Mishan's bibliography of welfare economics for the period 1939-1959 covers fourteen very full pages.

[34] The reasoning behind this paragraph is presented in the Appendix to this paper.

[35] Judy, Richard and Levine, J., *A New Tool for Educational Administrators: Educational Efficiency through Simulation Analysis*, University of Toronto Press, Toronto, 1965.

[36] These calculations were performed in 1963 when the author was on the staff of the Royal Commission on Taxation. I am grateful

for the help of Mrs. Frances Cutler, who did the calculations, and for the Commission's permission to reproduce the results here. The Commission takes no responsibility for the conclusions, which are entirely my own.

[37] Remember also that our calculations do not include the non-salary earnings of professors. When professors do any amount of consultation or contractural work, these excluded earnings can be large.

[38] See Hall, O. and MacFarlane, B., *The Transition from School to Work*, pp. 26-30.

[39] See Woods, H., and Ostry, S., *Labour Relations and Labour Economics in Canada*, Macmillan, Toronto, 1962, p. 298.

[40] See Peacock, A. T., "Economic Growth and the Demand for Qualified Manpower", *District Bank Review*, No. 146, June 1963, pp. 14-16.

[41] Economics and Research Branch, Department of Labour, *Engineering and Scientific Manpower Resources in Canada: Their Employment, Earnings, and Salary Rates, 1960-1*, Ottawa, 1961, Table 15.

[42] Peacock, A. T., "Economic Growth", *op. cit.*, pp. 17-18.

[43] Economics and Research Branch, Department of Labour, *Engineering . . . 1960-1, loc. cit.*

[44] Economics and Research Branch, Department of Labour, *Engineering . . . 1960-1, op. cit.*, Table 33.

[45] Scheme One: $\frac{(30 \times 2) + (50 \times 1)}{(20 \times 2) + (40 \times 1)} = 1.375;$

Scheme Two: $\frac{(60 \times 1) + (45 \times 2)}{(56 \times 1) + (25 \times 2)} = 1.41.$

[46] $\frac{30}{20} = 1.5; \quad \frac{50}{40} = 1.25; \quad \frac{60}{56} = 1.07; \quad \frac{45}{25} = 1.8.$

7

Measuring the Output of Educational Institutions

David Stager

Most of the recent studies in the economics of education have been concerned with the contribution of education to economic growth, with the private and social returns to investment in education, and with how the costs of education should be shared.[1] These studies refer to education in general terms as if it were a single, homogeneous product. Economists studying these problems have not needed to be concerned with a precise definition of output because they have been relating monetary returns to total expenditures, by years, for all types of education. Unfortunately, such studies have been based on differing concepts and measures for the output units of education; comparison of results is often difficult, if not impossible. Because little attention has been given to the development of concepts and measures of educational output, several important problems in the economics of education have been neglected.

The measurement of the output of an educational institution raises more conceptual difficulties than most other issues in the economics of education. The difficulties must be confronted, however, if some of the more critical questions regarding the allocation of resources among educational needs are to be examined satisfactorily.

It should be emphasized that this essay is concerned only with the instructional aspect of educational processes. No attempt is made to define the research output of educational institutions. Furthermore, we are concerned here with the output of post-secondary educational institutions only. Post-secondary education in this essay includes all institutions in Ontario offering formal schooling to students who normally are required to complete Grade 12 for admission to the institution. The definition does not include training given "on-the-job" or during military service.

Three approaches can be used in the measurement of the output of the educational industry: (1) intellectual development, (2) educational services provided (enrolments per period) and (3) market valuations. On the first approach, most educators probably would agree that the principal instructional product is "intellectual development" or an improvement in reasoning and/or language skills. Aptitude tests are discussed as the appropriate general measure of this aspect of educational output. Second, educational institutions are viewed as firms in an industry providing services in the form of classroom instruction and laboratory demonstrations. The third general measure of output, earnings differentials associated with different levels and types of education, is perhaps the measure which an economist would use first since market price is used in aggregative measures of other industrial output.

APTITUDE TESTS

It was assumed above that most educators would agree that the fundamental product of educational institutions is "intellectual development" or improvement in reasoning and ability to use language. This concept should be interpreted broadly enough to include the development of specific vocational skills and skills acquired in the institutions' extracurricular programs.

As an approximate measure of "intellectual development", aptitude tests, such as are now widely used at the secondary school level in the United States, could be modified and developed for post-secondary use. Standardized aptitude tests are the most desirable measure, because they take into account what would be non-quantifiable differences among institutions and over time if a measure such as hours or years of instruction were used. Furthermore, such tests could be used for measuring the output of informal education, such as apprenticeship and trainee programs. Most of the existing tests, however, are not measures of an absolute increase in knowledge or ability; they indicate the relative improvements made by the group of students taking the tests. These tests need to be modified, therefore, to measure the absolute improvement throughout any program or during any period of time.

There are a number of reasons why incremental test scores, although conceptually the most desirable measure of educational output, are not practical for many economic studies of education: tests at the post-secondary level are only now being developed; any given set of tests becomes less useful as the range in types of education included increases; the high cost of obtaining data will reduce the number of studies undertaken. It is necessary, therefore, to develop measures of educational output which will approximate the results which would be obtained from aptitude tests.

EDUCATIONAL SERVICES

Educational institutions may be viewed as firms offering a variety of services such as classroom instruction, laboratory demonstrations and library resources. If the "services" approach is used in approximating educational output, it may be assumed that the increase in students' intellectual knowledge is proportionate to the amount of time spent in the classrooms or enrolled at the institutions. No attempt is made, however, to measure the value derived from these services by the student, in terms either of intellectual development or of any other use to which the services may be put.

The number of degrees or diplomas of different types granted by each institution is sometimes viewed as a hybrid measure reflecting both intellectual development (to a minimum standard at least) and the educational services which a student must utilize to obtain the degree or diploma. The measure is not a useful one, however, because the different types of degrees cannot be aggregated, even at a given level of the educational system. Any attempt to equate or compare different degrees usually depends at least on a comparison of the number of years of study of various subjects required for the degree. Furthermore, this degrees-granted measure of output does not take account of partial fulfilment of degree requirements and thus understates the total educational output.

The most frequently used measure of educational services is the number of students enrolled in each institution for each year or for each semester. Enrolment data have been widely used, both because they are available for most institutions and because they are generally suitable for economic studies at the elementary school level and, to a lesser extent, at the secondary level. Enrolment data are much less satisfactory at the post-secondary level because of the greater diversity of services offered at this level. If different types of institutions were compared on the basis of student-classroom hours, the institutions where lectures are substituted for reading assignments would appear to have the greater output. If, however, we assume that the parameters, such as the student:teacher ratio, do not change, enrolment data can be used in the comparison of educational patterns which are offering more or fewer of the same services. We could, for example, use enrolment data when comparing the existing educational pattern with the year-round operation of these institutions. This measure can be improved by adjusting the sessional enrolment data to take account of the variation in the length of lecture or laboratory periods, in the number of classes per week and in the number of weeks in the session of different institutions. Such an adjustment would yield the number of curriculum hours provided by each educational institution.

Apart from tests of intellectual development, curriculum hours are presently the best output measure for comparisons of similar institutions or programs. But as the technology of education changes, curriculum hours will become less satisfactory. Educational television, programmed learning, recorded lectures and other audio-visual aids may produce much greater differences in intellectual development during a given number of classroom periods at different institutions than was the case under a more-or-less standard lecture-laboratory system.

Technological changes in educational methods are likely to raise more frequently the quality-quantity issue which has made it so difficult in the past to achieve agreement on measures of educational output. Quality and quantity are words often used carelessly in discussions of education. The issue has arisen because some persons have referred to quality differences in *output* when they have been talking about quality differences in *institutions*. Clark, for example, in trying to establish a definition of quality, states that, "In general, and in accordance with customary usage, an increase in the quantity of learning in a given period of time will be described as a qualitative improvement in education".[2] But if it has been possible to increase the educational output in a given period of time, the educational institution has been improved (a qualitative change) while the change in output has been a quantitative one. It should be useful, therefore, to examine each of the aspects of education where quality differences are said to arise in order to see how many of these "quality" differences can be translated into quantitative terms. Shultz, for example, takes account of "quality differences" in the school year over the past several decades by adjusting the number of years of schooling according to the length of the school year.[3]

Burkhead and Clark are clearly wrong when they say that, ". . . in education it is not possible to distinguish the quality of education from the quantity of education".[4] Their question, "If methods of teaching reading are improved such that third grade students now read at the fourth grade level, is this an improvement in the quantity or quality of education?" can be answered simply. There has been an improvement in the quality of third grade teaching, because there has been an increase in the output of the third grade.

The so-called "quality" differences probably can be quantified only through the use of certain achievement tests. It is because these tests have not been available, or have not been applicable on a large scale, that the "quality" problem has persisted. In using proxy measures of educational output some aspects of this output have not been quantifiable. Nevertheless, it is important that these non-quantifiable aspects be distinguished conceptually from quality differences between educational institutions.

MARKET VALUATIONS OR EARNINGS DIFFERENTIALS

The curriculum hours measure is an appropriate measure of output if one is comparing institutions which are offering more or fewer of the same services. Another measure must be found, however, for comparing the output of different kinds of institutions, such as teachers' colleges and technological institutes. The differences in market valuation, or the earnings differentials, related to different levels and kinds of educational attainment, are one such measure.

When using this measure, one must distinguish between the *output* of educational institutions and the *benefits* of, or returns to, education. The output of the educational system includes the distribution of knowledge and increases in reasoning ability (to use and add to knowledge) and language ability, the development of vocational skills and the encouragement of inventiveness, intellectual curiosity and creativity. Benefits (social and private) are derived from this output and include increased earnings and economic growth, consumer satisfaction (in the possession and use of knowledge), offsprings' attitudes toward education, increased contacts, responsible citizenship, sense of fulfilment in life, flexibility and adaptability of the labour force, opportunity for more education, wider range of occupational choice, heightened aspirations, improved health standards and so on. Although it is necessary in many cases to use the benefits of education as an approximate measure of output, it should be clearly stated when this is being done. Frequently, for example, economists have referred to "the productivity of education". This phrase is ambiguous. It can refer either to the differences in personal or national income with respect to different levels of educational achievement or expenditures, or to the outputs of the educational institutions with respect to either monetary or intellectual inputs.

There are two major objections to using earnings differentials to approximate the magnitudes of educational output. First, earnings reflect both supply and demand conditions in the labour market, whereas we wish to measure only the supply. Graduates in economics or chemistry, for example, may have higher average earnings than graduates in biology or history, yet all groups may represent the same level of educational output in terms of intellectual development. One might be able to set up hypothetical market situations for each type of graduate to adjust the earnings data for differences in demand, but there is no apparent criterion by which one could be certain that the hypothetical situation was more appropriate than the actual one. We must acquiesce, therefore, to using actual earnings data.

Second, it may be objected that actual earnings differentials cannot be used to approximate the output of a hypothetical pattern of educational institutions if the new institutions will produce a labour force quite different in composition from the existing labour force. It is expected, in making this objection, that the relative wage structure will be altered to such a degree that existing earnings differentials will no longer be useful. Before assuming that this was the case, however, it would be necessary to examine the specific predicted composition of the new labour force and the current utilization of skilled and professional manpower. It may be, for example, that an increase in technicians, rather than decreasing technicians' salaries, will increase their salaries, if engineers and technologists are shifted to more productive employment and if the increase in the technician:engineer ratio raises the marginal productivity of this technical team.

In this essay, it is assumed that the existing relative wage patterns would not be changed by the introduction of new types of institutions. This is a strong assumption to make. But as long as the assumption is clearly recognized, there is no reason why studies using it could not yield quite valuable results.

The use of earnings differentials to approximate differences in educational output assumes that differences in employees' marginal value products can be attributed wholly to differences in levels and types of education, and that earnings received by employees reflect their marginal value products. These assumptions will be examined separately.

It has been argued that there are "reasons for thinking that earnings differentials may not always be an accurate reflection of differences in marginal productivities".[5] These reasons are described as "conspicuous production", "tradition-bound" wage structures, non-monetary attractions of jobs open to graduates, external economies and collective power. "Conspicuous production" refers to the possibility that some employers may choose to hire college graduates (and pay them "college graduate" salaries) for jobs which do not really require college training. However, this factor is not relevant to a comparison of the output of different post-secondary institutions, since we are concerned only that college graduates in fact be paid "college graduate" salaries. Whether or not these persons are underemployed is a problem of manpower utilization rather than one of measuring the supply of manpower.

The problem of "tradition-bound" wage structures would be of considerable importance to the economic comparisons of this study if this situation existed in the advanced economies. The problem is more significant in less-developed countries. As post-secondary education becomes more widespread and as mobility of similarly-educated persons among industries and occupations increases, this factor diminishes in importance.

Variation in earnings differentials due to non-monetary attractions of jobs is of greater concern.[6] In a discussion of the non-monetary benefits of education, Bowen uses the example of the garbage collector who may now or soon be paid more than a full professor because garbage collecting is a dirty, hard or unpleasant job. This is a dramatic example and exaggerates the problem at the post-secondary level. Most technicians, technologists and engineers, for example, work under fairly similar conditions. Non-monetary aspects of employment are likely to be more significant at this level between persons who are employed in business, and those who are employed in government but have the same educational qualifications.

Collective power is one of the most important causes of an imperfect labour market at the post-secondary level.[7] This power takes the form of both monopoly and monopsony. Professional associations, such as those for engineers, lawyers, doctors, and now teachers and government employees, cover a significant portion of the post-secondary graduates. On the demand side, the federal and provincial governments have rather rigid salary scales which are not necessarily altered in accordance with changes in labour market conditions.

The net effect of these market imperfections on the outcome of any economics of education study is probably fairly small. As a result of collective power, the effect is likely to be in favour of the more highly-educated graduates and therefore to understate the educational product of a system which produces a higher ratio of, for example, technicians to engineers compared with another system with a lower ratio.

As mentioned earlier, the second major assumption in using earnings differentials to approximate educational output is that the differences in workers' marginal value products could be attributed wholly to differences in levels and types of education. The influence of factors other than education is obviously included in earnings differentials. Subsequent on-the-job training, experience, motivation, native ability (and wit), family and social connections together account for a significant part of the differentials.

Several American studies of income-determinants agree that education is clearly the most important single factor explaining income differentials. One study[8] of heads of American households attempted to isolate the pure effect of education on earnings with the aid of multivariate analysis that allowed separately for many of the various factors influencing the level of personal income: age, formal education, on-the-job training, sex, race, native intelligence, need-achievement drive, parents' education, family size, father's occupation, religion, geographic region, city size, occupation choice, occupation mobility, mortality, unemployment and hours of work. As the authors of the study pointed out, the fact that the variables are themselves closely correlated means that there is a tendency to remove too much and therefore to understate the pure effects of education. In spite of this tendency, factors other than age and education together explain only 40 per cent of the gross unadjusted earnings differentials between high school and college graduates in the age group 18 to 34, and only 12 per cent in the age group 35 to 74.

Two other comprehensive analyses[9] of several studies relating earnings to education and other factors agree that approximately two-thirds of the gross earnings differentials between college and high school graduates is due to education alone. In an evaluation of these American studies in the light of the British educational system, an English economist[10] suggested that it would be reasonable to adopt for British studies the assumption that two-thirds of the gross earnings differentials between college and high school graduates in the United States is due to education alone.

Until further examination discloses otherwise, it is probably satisfactory to adopt the same two-thirds assumption for Canadian studies. However, one could argue that the lower the proportion of the post-secondary age group enrolled in education, the lower is the contribution of education to income differentials.

A number of questions on the use of earnings differentials data remain. How valid is the use of cross-sectional data for representing expected lifetime earnings? What discount rate, if any, should be used when calculating the present value of returns to investment in education? Which earnings data should be used? How should the education of persons outside the labour force be evaluated?

Objections may be raised to the use of cross-sectional data for projecting lifetime earnings. As succeeding age groups have higher and higher levels of education, it has been argued, the earnings differentials at any educational level may narrow. But a study of the income differentials between high school and college graduates showed that there was relatively little change over the period from 1939 to 1958.[11] The probable explanation for this relatively small change in income differentials, in spite of a relatively large increase in the number of college graduates, was that the demand for college graduates changed in pace with the supply. Due to changing technology, the demand for trained workers accelerated following the Second World War, and industry absorbed the increased flow of university graduates quickly enough to maintain the earnings differentials. Therefore, to the extent that the demand for skilled and professional manpower continues to increase as it has in the past, the cross-sectional data appear relevant for projections of lifetime earnings. Again, it would be necessary in any study to examine the specific sections of the labour market to determine where cross-sectional data may introduce a downward or upward bias.

It has also been pointed out that earnings data for the older age groups are related to education received several years ago when the intellectual or skills development during any given period was not as great, on the average, as in more recent years. This problem is another case of the difficulty of comparing unadjusted years of schooling. One could simply adjust the years of schooling data to obtain comparable curriculum-hours data, but the results of the adjustment probably would not be significant enough to merit making the adjustments. This factor should be taken into account when final comparisons are examined to see if the differences might be overstated or understated.

One of the strongest arguments favouring the use of cross-sectional data is that they provide projections of lifetime earnings in terms of constant purchasing power.

Which of the several categories of earnings data should be used? Obviously, earnings rather than income data should be used because the latter includes receipts which cannot be attributed directly to the market valuation of additional education. It has also been argued that hourly earnings rather than annual earnings should be used because the latter reflect "the unwanted unemployment of the less educated, and the desired extra leisure that can be afforded by those with more education".[12] Where the indirect effects (both positive and negative) of education must be excluded, it is necessary to use hourly rather than annual earnings. Furthermore, median rather than mean earnings differentials should be used. Mean differentials tend to be skewed in favour of higher educational levels due to the influence of factors other than education in the determination of earnings.

One of the most difficult questions in using earnings differentials to approximate educational output concerns the evaluation of education received by persons who are not in the labour force. If the intention is to approximate the output represented by *all* graduates of the educational system, could the earnings of persons with similar education be applied to those who are not in the labour force, or should only actual labour force data be used? Furthermore, should the lifetime earnings data for married women be adjusted to take account of the fact that only a very few of them are continuously in the labour force?

The *prima facie* view may be that this is an example of the conflict between the interests of educators and of manpower planners, and that both of the above suggestions should be followed. A more careful view suggests that manpower planners should be interested also in the potential market value of all educational output, since by comparison with the actual market value (of those in the labour force), the former provides a measure of the underutilization of highly trained manpower. The economic incentives necessary to bring more of this manpower into the labour force may, of course, be extremely great. A comparison of the potential and actual market value of the output from different educational systems may also be a useful criterion in deciding which system should be adopted. That is, one system may induce a higher proportion of graduates to enter the labour force than would another system.

There are obvious and considerable difficulties in making such comparisons. It was argued earlier that existing earnings differentials could be used, with recognized caution, in the case of hypothetical alternative patterns which altered the composition of the labour force. The changes in that case would be minor compared with the effects on relative earnings of bringing most women into the labour force. It would be necessary to estimate the changes in earnings not only of women with post-secondary education, but also of those with less than this level. This brief discussion should indicate both the desirability of such a comparison and the extreme difficulty in preparing data for it.

OTHER OUTPUT MEASURES

There are some aspects of different educational systems which normally might not be regarded as outputs of the system. For some purposes, such as deciding which of two educational systems should be adopted, it is useful to include these factors in the discussion of output measures. Some of the distinctive features of different systems would include:

(1) the *retention rates* of each year, course and type of institution. When one considers the less efficient use of educational resources resulting from drop-outs, the ability of an educational system to retain its students for the whole of the diploma or degree program can be regarded as a significant measure of its effectiveness.

(2) the *enrolment indices* expressed as a percentage of high school graduates and of relevant age-groups entering the post-secondary level. One system may have high retention rates but admit an extremely low proportion of all high school graduates. If equality of opportunity for post-secondary education is a political or educational goal, then a pattern of education which attracts a higher proportion of the high school students or of the age group can be considered more desirable.

(3) *potential for further education* expressed as the percentage of graduates who could proceed directly to the next higher level of education.

(4) the *ratio of technicians and technologists to professionals* being graduated from the system. Although an optimum aggregate ratio has not been determined for any given relative wage structure, this ratio in some educational patterns may be quite different from that in others and from the general magnitude of the desirable ratio.

(5) the *vocational guidance and job placement services* of the institutions.

These are only a few of the significant features which differentiate educational systems and which could be included in a prose description of the output.

HUMAN CAPITAL

There remains one other measure of the output of the education industry that cannot be omitted from this discussion. This is the concept and measure of human capital which has been developed by T. W. Schultz.[13] Schultz's concept is based on "the proposition that people enhance their capabilities as producers and as consumers by investing in themselves and that schooling is the largest investment".[14] Economists have attempted to measure the total stock of human capital in a country, just as they have attempted to measure the total stock of physical capital. Because the amount of education "possessed" by an individual is generally measured in terms of years of schooling, it is quite natural to suggest this unit of measurement for the total stock of human capital. Thus, it is tempting to say that if the average member of the labour force has had eleven years of school and the total labour force is seven million persons, the value of the total stock of human capital is equivalent to the cost of seventy-seven million school years.

It was pointed out earlier that such a measure fails to take account of differences in the development of intellectual and other skills in different types of programs and in the "same" program over a period of time. Schultz has developed a somewhat more sophisticated concept by adjusting the total number of school years, using the length of the 1940 school year as a base. This still had the disadvantage of not taking into account changes in the composition of human capital with respect to the years of schooling at each of the elementary, secondary and post-secondary levels. Schultz therefore weighted the number of years at each of these levels by the estimated *cost* of providing education for one year at each level. However, the introduction of costs into an output measure renders it unsuitable for many of the studies in which an output measure is required. Any study which is concerned with the allocation of resources within education or among social investment projects, for example, would not be able to use a human capital, or output, measure which is based on monetary inputs. Nevertheless, Schultz's attempts to develop measures of the stock of human capital have been extremely useful, because they have raised several important questions about which costs should be included in cost-benefit studies of education.

SUMMARY AND CONCLUSION

As the resources devoted to education continue to increase at rising rates and as the diversity in the preparation and preferences of persons going on to post-secondary education increases, there will be an even greater need for economists to examine carefully the allocation-of-resources problems in education.

Of the many education problems economists could study, the question of selecting the appropriate patterns of post-secondary education is one of the most crucial. What is much less clear than that more education in general is "a good thing" or "pays off" is what kinds of education should be provided and in what kinds of institutions. For example, should Ontario expand the present pattern consisting of universities, teachers' colleges, nursing schools and institutes of technology, or should it combine the latter three types of institutions under a community colleges system with an even greater variety of programs? Should universities and community colleges attempt to meet all of the post-secondary needs, or should liberal arts colleges be introduced as well? Should any of these patterns of post-secondary education be operated on a year-round basis? These questions have, of course, been discussed at length by educators, but it is only recently that economists have returned to the study of the economic aspects of these proposals. Once the appropriate pattern has been selected, adjustments in class sizes and changes in teaching techniques can be introduced gradually. However, commitment to one pattern or another cannot be easily revoked.

But before these problems can be handled satisfactorily, suitable measures of the output of educational institutions must be developed. We cannot compare either alternative patterns of higher education or specific teaching techniques unless we are quite clear about the products we are comparing. Ideally, one output measure would be developed which would be satisfactory to studies concerned with different teaching techniques and with different types of courses and institutions. The most likely candidate for this measure is some form of aptitude test. Until such a test can be developed, proxy measures must be found, but such proxy measures have a more restricted application than the aptitude test. The curriculum hours measure is most suitable to a comparison of similar types of institutions providing more or fewer of the same types of services over a given period of time, whereas the earnings differential measure is better suited to a comparison of a proposed new type of institution with existing institutions. The inadequacies of these measures should not deter economists from making studies based on them; only by using these concepts and measures will more suitable ones be developed.

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[5] Bowen, W. G., *Economic Aspects of Education*, Industrial Relations Section, Princeton University, Princeton, 1964, p. 17.

[6] See Professor Hollander's article in this collection for a discussion of the view of the classical economists on the role of non-monetary attractions of jobs.

[7] See Professor Kruger's article in this collection for a discussion of the impact of imperfections on the labour market.

[8] Morgan, J. N., *et al.*, *Income and Welfare in the United States*, McGraw-Hill, New York, 1962.

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[13] Schultz, T. W., "Investment in Human Capital", *American Economic Review,* Vol. LI, March 1961, pp. 1-17 and his book, *The Economic Value of Education,* Columbia University Press, New York, 1963.

[14] *Ibid.,* p. x.